Railways of Australia

NETWORK

Vol. 16 No. 4 May 1979 Price: 50 cents

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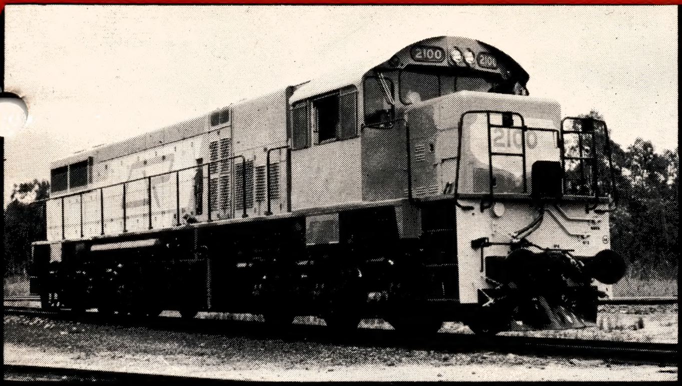
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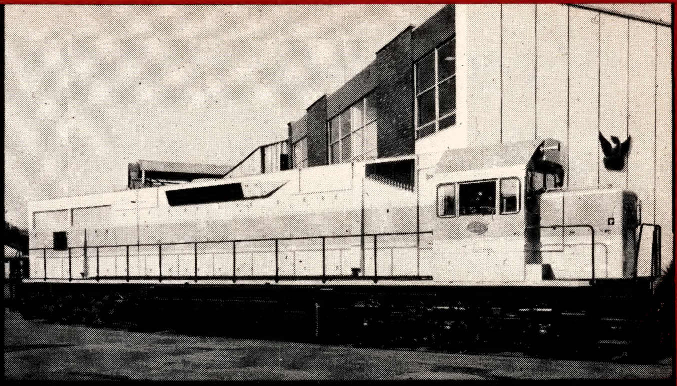
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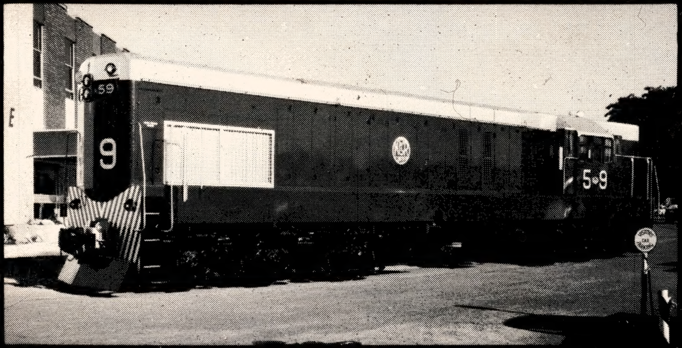
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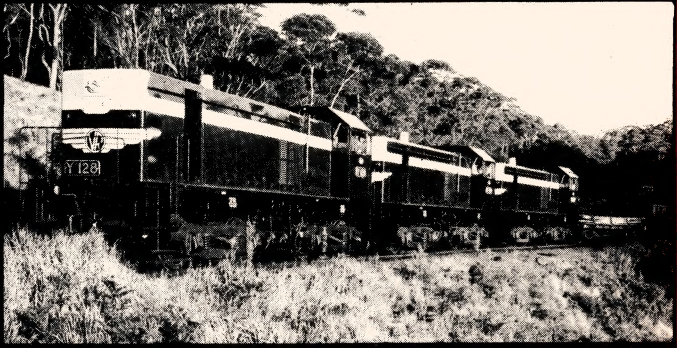
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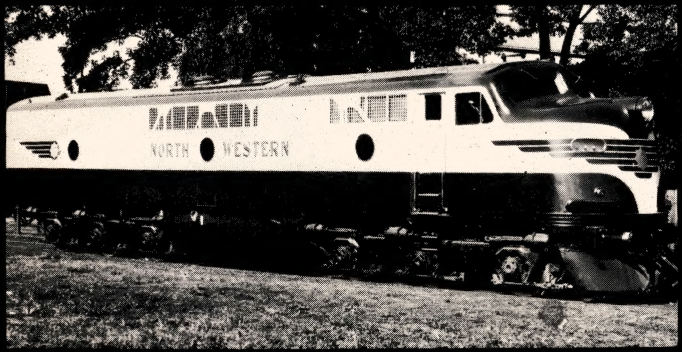
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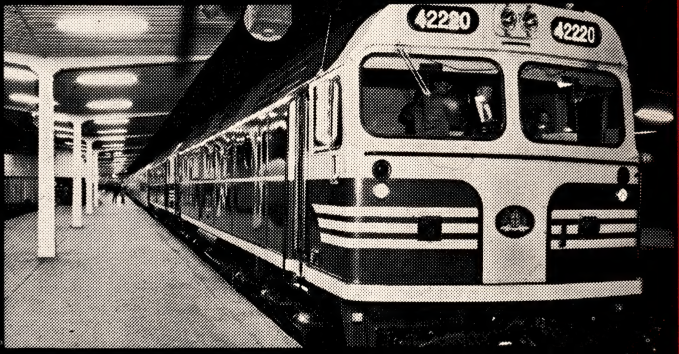
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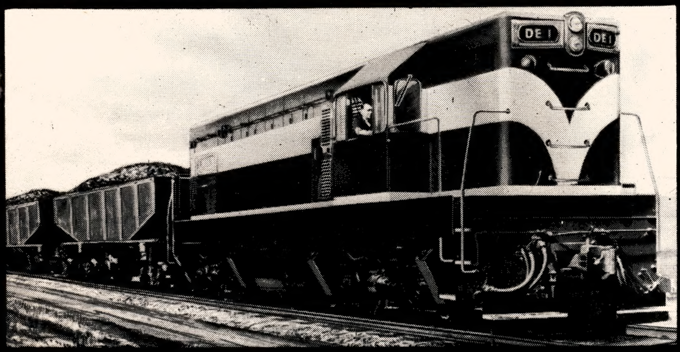
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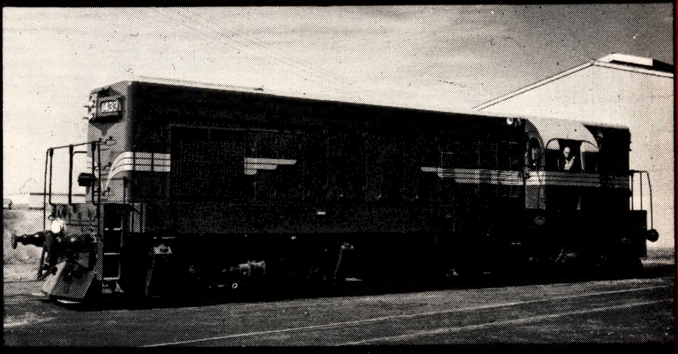
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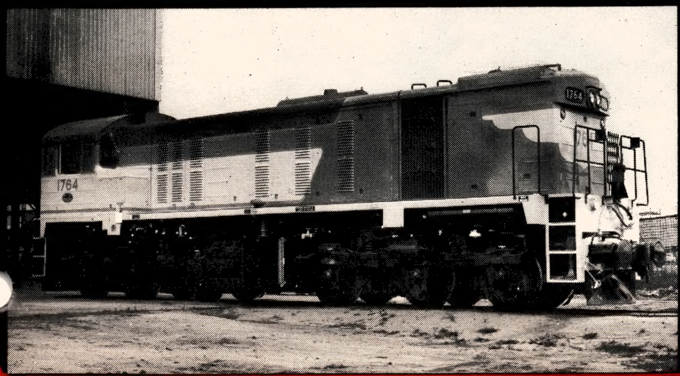
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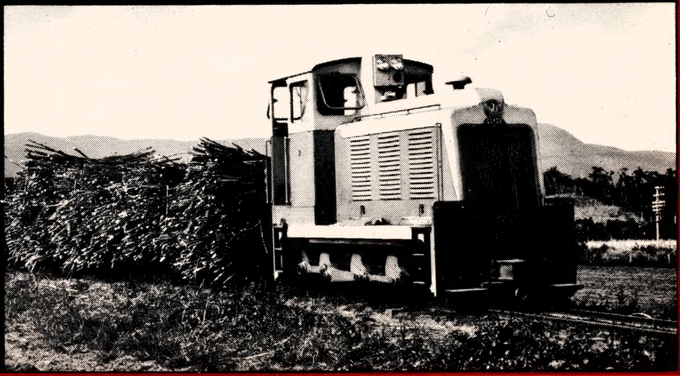
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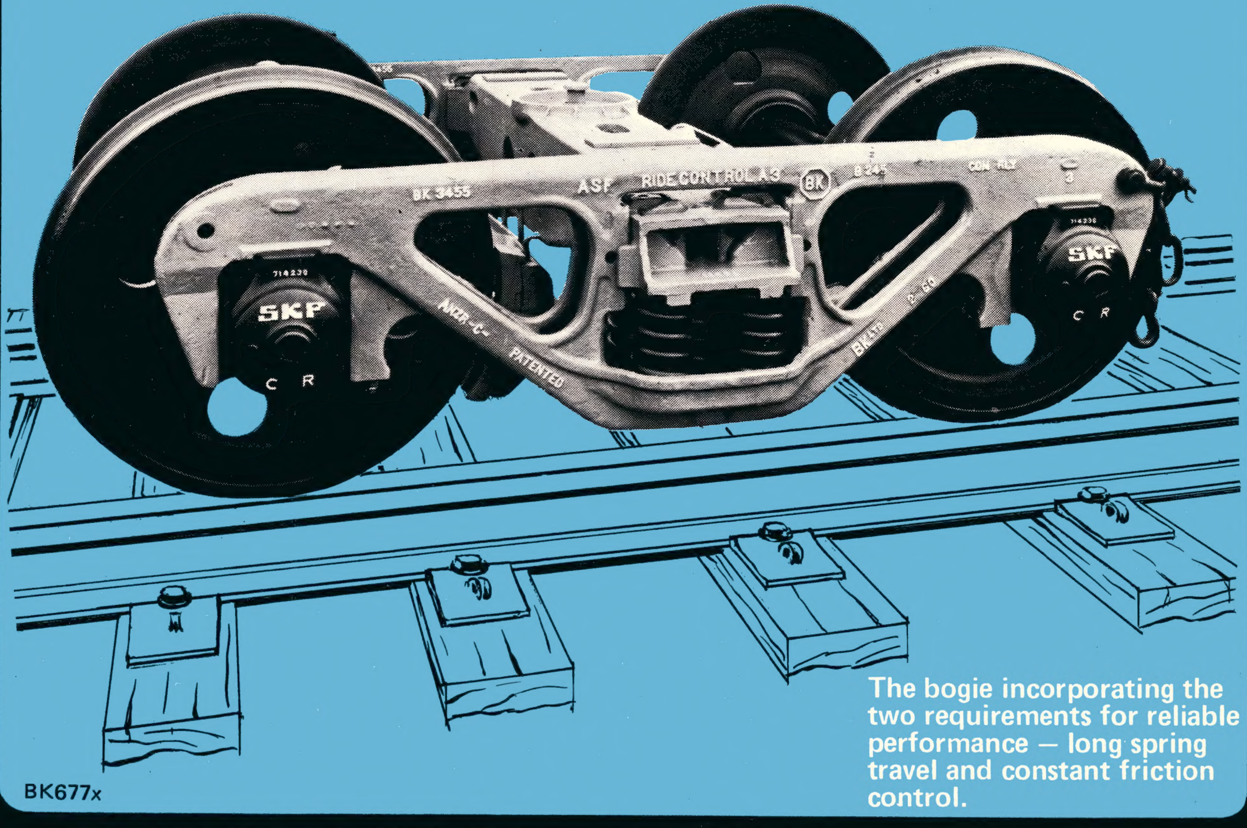

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Railways of Australia

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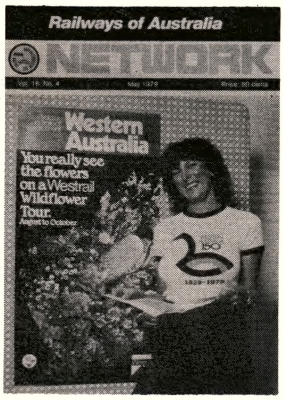
Vol. 16 No. 4 May 1979



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- Queensland Railways
- Victorian Railways
- Western Australian Government Railways

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OUR COVER

Proudly displaying her Western Australian 150th Anniversary T-shirt and the new Westrail Wildflower Tour Poster is Sue Hilliam of the Western Australian Government Travel Centre in Melbourne.

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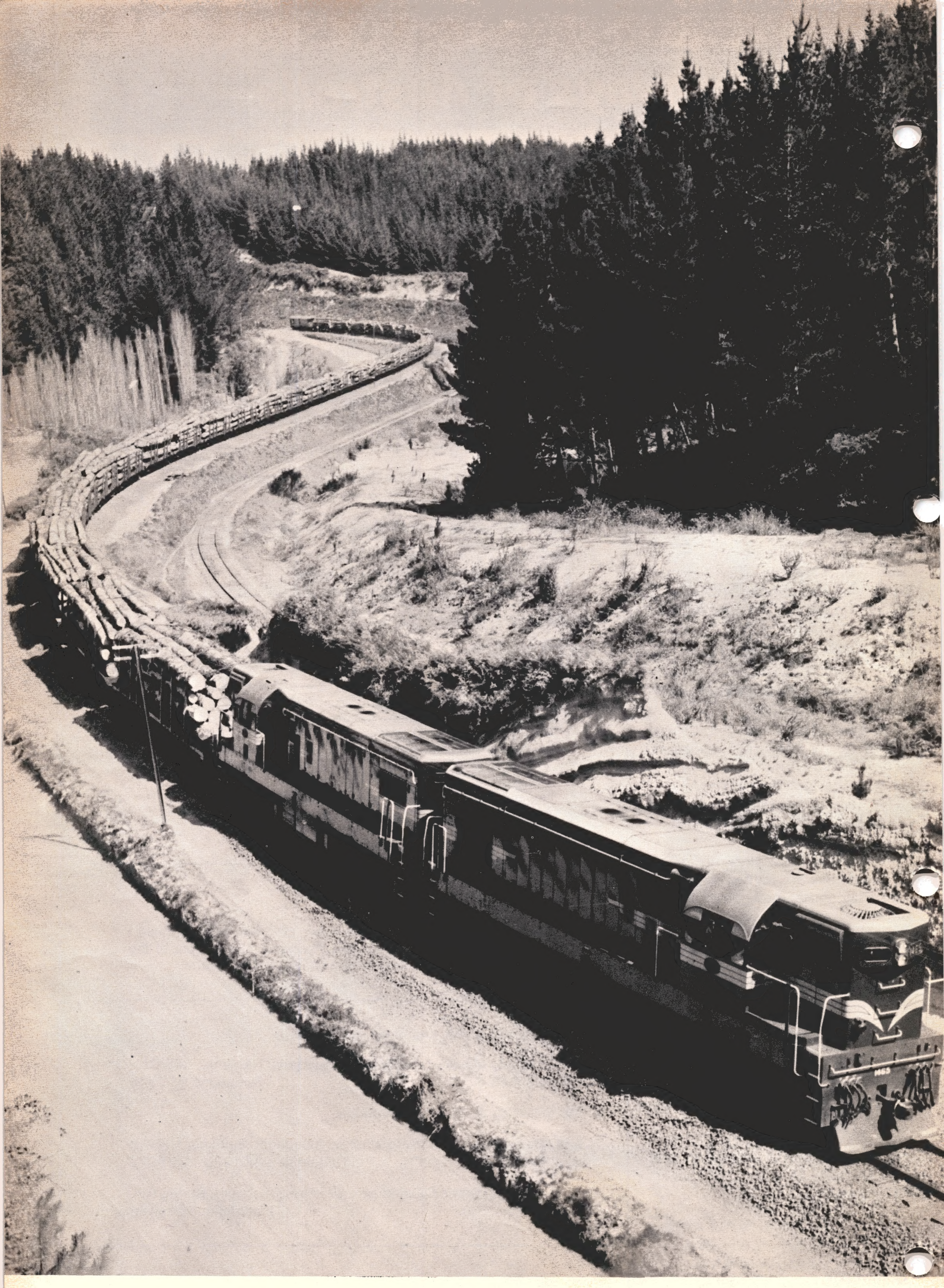


An NZR log train between Murupara and Kawerau.

Railways of Australia
NETWORK

From the Executive Director's Desk

Making Friends for Australia — or losing them

The launching of the Australian Tourist Commission's "Make Friends for Australia" campaign was a bold marketing initiative.

Its introduction, timed to perfection, coincided with the much debated lower international air fares; and it was whole-heartedly supported by influential tourism-conscious organizations — including QANTAS, TAA and Railways of Australia.

The basic concept is beyond all doubt; Australians overseas are intensely proud of their country, could become really effective ambassadors and, in so doing, put Australia on the tourist map.

The effectiveness of the campaign may likewise depend upon the extent to which the States, the major cities and Australia's travel industry support and participate in the programme.

Results are not likely to be apparent either immediately or quickly. Time must be given for Australian travellers' awareness of the programme to develop; it may be six months or more, towards the northern autumn, before their "propaganda" yields tangible results. It may well be much longer before any significant growth in tourist visitors can be attributed to their efforts.

In the meantime, immediate steps can and should be taken to ensure that the hopes and expectations of today's tourists are fully realised, so that they return home to encourage others to follow in their wake.

It is estimated that, at the present time, almost half our tourist visitors have no planned itinerary when they arrive. They are often surprised, and even bewildered when they do not find the familiar information offices at or in close proximity to the airport; and they then find public transport from the airport to the city far less than obvious and satisfactory.

How can the Australian railways assist these prospective customers and acquaint them with our interstate services and our tourist packages?

This is by no means a rhetorical question. Most readers of "Network" have travelled. Their experiences and suggestions can contribute significantly, and stimulate immediate and worthwhile discussion. Indeed, all Australians at home can contribute just as significantly as those overseas, to the "Make Friends for Australia" campaign.

This year, the United States alone is expected to send at least 25,000 more to our shores, and a similar increase is expected from the British Isles. Not only are the numbers increasing — the length of stay in many cases is expected to increase significantly.

These people may, perhaps, differ from our preconceived ideas of the overseas tourist. But they will all be looking for good value in their Australian ground arrangements. Our travel programmes must be better presented than ever before; and Railways of Australia will need to promote their services as vigorously as their competitors who will also be expecting an increase in sales volume and promoting accordingly.

We have facilities and services. Let us offer them with pride, and consideration, welcome the incoming tourists, and "Make Friends for Australia" within Australia itself.

Let us provide the most accurate information and the maximum assistance possible, and do so in a polite and friendly manner. It is not difficult to do so, and the dividends could be considerable.

Let us all, in short, "Make Friends for Railways of Australia".

NEVILLE J. GAZZARD
Executive Director

And a reminder from the Editor . . .

Every "Network" reader can also contribute towards a better, brighter, more effective and more widely ranging magazine. There must be many phases of railway activity and concern that are all too seldom mentioned in our pages. There must be many incidents and scenes which would interest our readers throughout the Commonwealth and widely scattered overseas — be they presented as comments, brief letters, or photographs.

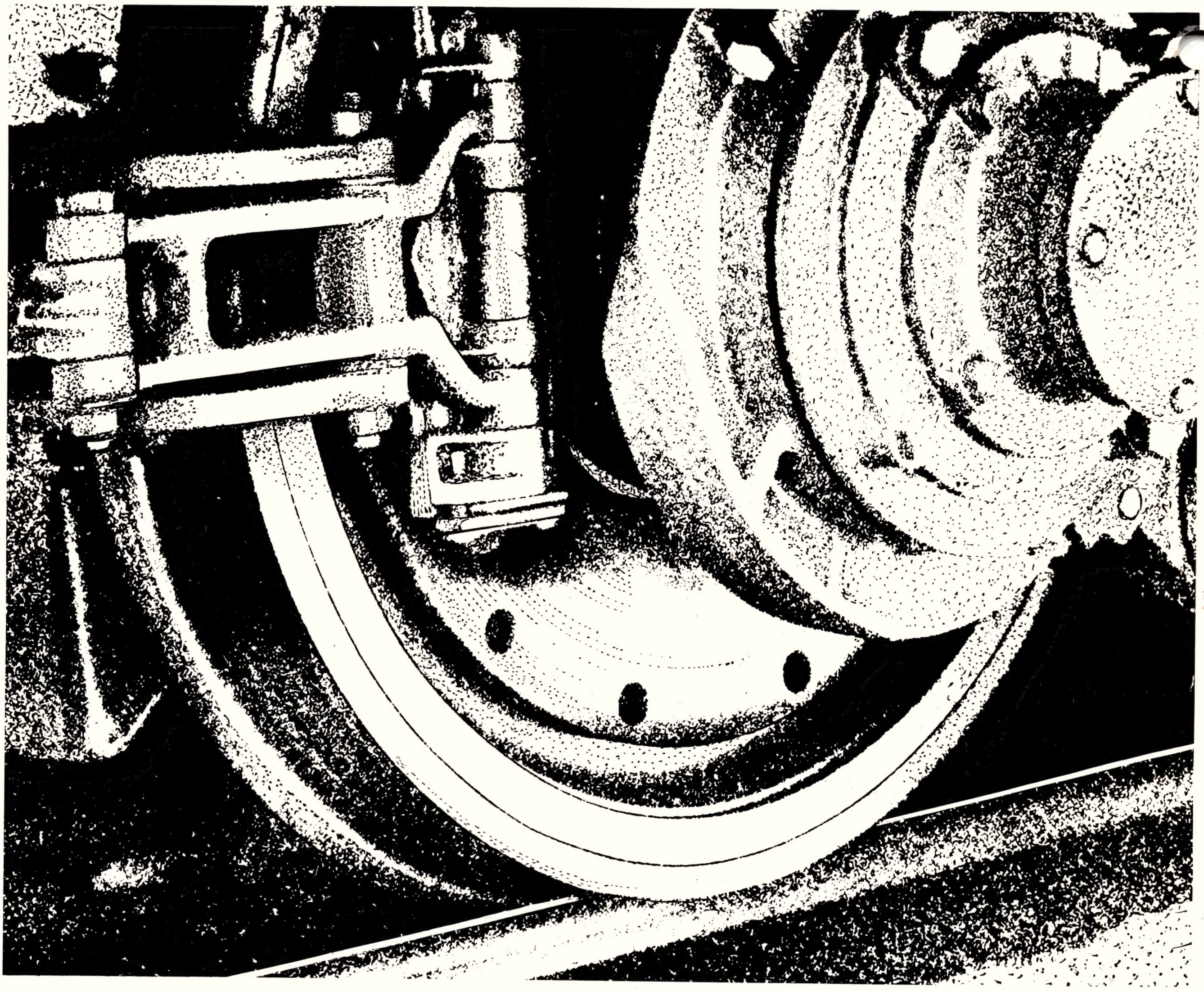
Clubs, organizations, societies and individuals — whatever aspect of railway activity or interest they reflect — might well "Make Friends with *Network*", and help us to make known the full extent of the devotion and consideration that the Railways of Australia command.

* * *

Australia's railways spend almost $350 million each year on equipment and stores. Even more is spent on new and upgraded services.

Network provides railway suppliers with complete coverage of this vast Australian market. It reaches all responsible officers in both the Government-owned and the private systems. It also reaches every member of Parliament, and the leaders of industry, commerce and finance.

The advertising rates are really competitive; the avenues for details are set out on p.3.



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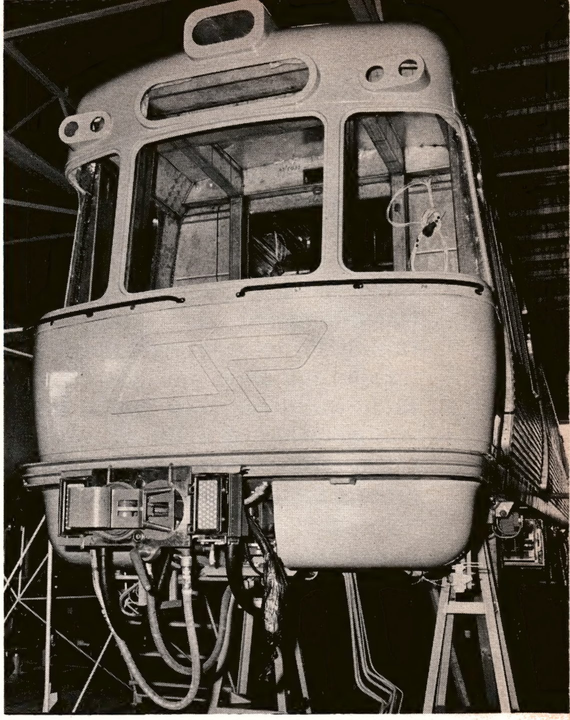
The Electrification of the Brisbane Suburban Railway System

2. Brisbane's Electric Multiple-Unit Vehicles

This is the second in a series of articles on technical aspects of the project. The first appeared in November last.



An initial 39 electric cars are being built by Walkers-ASEA Pty Ltd at Maryborough, at an estimated final cost of $22 million, including spares. The rolling stock is made up as basic three-car consists, each comprising a driver motor car (DM), a motor car (M), and a driver trailer car (DT).

Multifunction automatic couplers are fitted to the driving ends of the DM and DT cars, to enable two units to couple together and operate as a six-car train for normal peak traffic. Semi-permanent bar-type couplers are fitted at the intermediate ends within each three-car unit, as the unit cannot be further subdivided during normal operation.

Body Construction

Body construction is of high-strength corrosion-resistant type 301 stainless steel, with the exception of the headstock and dragbox areas of the underframe. The underframe, body framing and exterior sheeting are welded together to form an integral structure.

The cars are designed for a static draft load of 900 kN and a compressive end load of 1800 kN applied through the draft gear without exceeding the safe design stress. They are also designed to withstand a static end load of 550 kN applied to the front and rear end structural members at 1,650 mm above rail, without permanent deformation.

All cars are fitted with a collapsible energy attenuating element built into the couplers, so that two elements in series can absorb the kinetic energy of a 45 tonne tare mass car impacting a stationary car at 15 km/hr.

All cars are fitted with two double sliding passenger doors on either side, each having an effective opening of 1,260 mm. A hinged door is provided at each side of all crew compartments. End doors and gangways are provided for pedestrian intercommunication between cars within a three-car unit.

Bogies

Bogie frames are fabricated from steel plate, welded to form rectangular box sections. They are stress relieved after welding, and critical faces are machined to ensure the wheels and axles are held true and square. Primary springs are rubber bonded, chevron type, mounted between the axle boxes and the bogie side frames.

Air springs are fitted directly between the body and the bogie for the secondary suspension with height control valves that vary the pressure within the air springs to maintain the floor height under changing passenger loads.

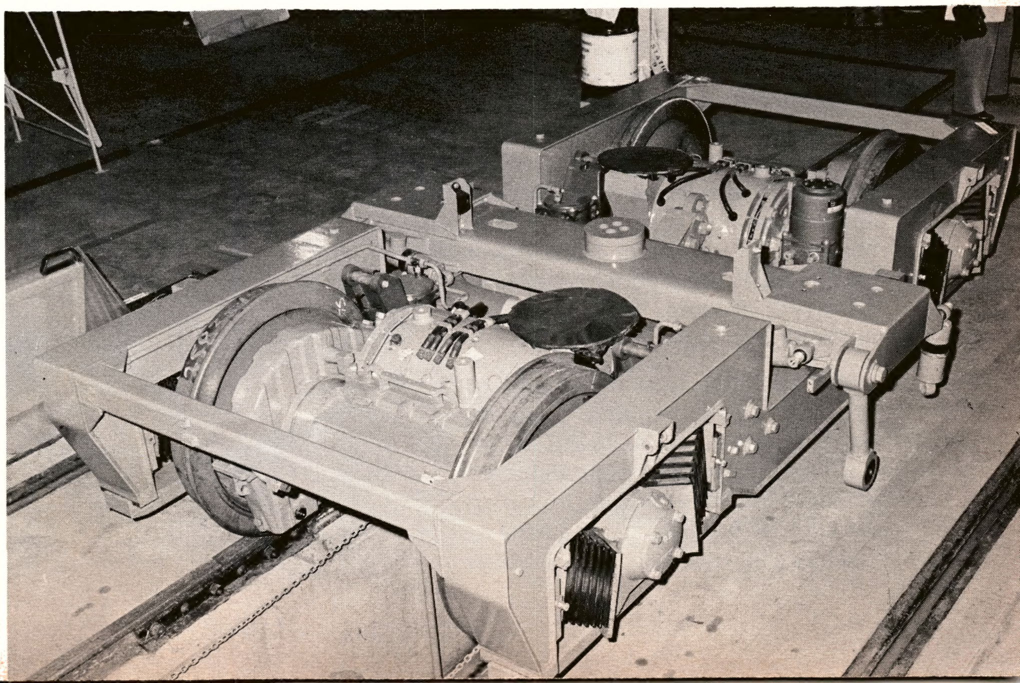
The air suspension pressure will be monitored to ensure that the maximum acceleration and braking is maintained for all variations in passenger loading without causing wheel slip or slide.

Traction and braking forces are transmitted through traction rods from the bogie bolster to the side sill of the underframe. A torsion bar is fitted between the body and the bolster to reduce body roll at high speed, and hydraulic shock absorbers are fitted in both the vertical and horizontal directions to improve the riding qualities.

Friction brake gear on each bogie consists of four S.A.B. unit-type brake cylinders with built-in slack adjusters. High friction non-metallic brake blocks are used. One brake unit on each bogie also incorporates a spring-applied, air-release parking brake, which is train lined for remote application and release from any driving position.

Wheels are solid rolled steel, with quenched and tempered treads, giving a hardness of not less than 302 B.H.N. Axles will be forged from Comsteel 4340 steel having an ultimate strength of 770 MPa. Wheel seats are provided with stress relief grooves and are cold rolled at 100 kN force to improve their fatigue strength. Wheels are pressed on the axles with a force of 800-950 kN. All bogies are fitted with roller-bearing axle boxes, grease lubricated.

All axles on the DM and the M cars are fitted with axle-hung traction motors. The motors are suspended on roller-bearing suspension tubes, which are mounted on



the axles before the road wheels are pressed on.

Traction Equipment

Single-phase current is collected from the overhead contact wire at 25,000 volts AC by a pantograph, which is a single-arm type with frame-mounted air cylinders for raising. Power is brought down to a transformer under the centre car of each three-car unit by a high-voltage cable. A lightning arrestor is also mounted on the centre car to protect the equipment from lightning surges.

The transformer has two secondary windings connected in series for traction. Power from the transformer is rectified to a maximum of 1,100 volts DC by a phase angle converter on both motor cars (DM and M) to supply the traction motors.

The transformer is rated at 1,340 kva for traction. It is naturally cooled with mineral oil circulating through large-bore radiator tubes and natural air flow caused by the movement of the train.

Each converter has two bridges in series, one connected to each of the two secondary windings. The converters are also self-ventilated by the movement of the train.

The traction motors are separately excited in both the traction and dynamic braking mode from a separate transformer supplied by the tertiary winding of the main transformer. The traction motors are continuously rated at 135 kw each and are self-ventilated, with cooling air being drawn in through inlets and ducts built into the car body sides.

Braking Equipment

Three separate braking systems for stopping the train are incorporated in the EMUSs, all controlled automatically by the movement of the driver's brake controller.

The main brake is an electro-pneumatic system with graduated application and release, load compensated for variations in passenger load. This is blended with dynamic (electric) braking, with an automatic air brake as a back up.

All the braking will initially be by means of the dynamic brake on the DM and M cars. If this is not sufficient, air will be supplemented on these cars and on the DT car to provide the braking rate required.

Should the electric brake fail at any stage, the change over to friction braking is automatic, without any additional action being required by the driver.

The braking system also incorporates a dead man's feature controlled by the spring-loaded handle of the power controller and by a foot-operated pedal. Either may be used independently to obtain power and prevent an automatic brake application. If both devices are released, a full brake application will be initiated.

Automatic Warning System (AWS)

An additional safety feature is the provision of the Automatic Warning System (AWS). This is an extension of the Station Protection Control (SPC) fitted to diesel electric locomotives. Permanent magnets and electromagnets placed centrally between the rails ahead of colour light signals will activate a magnetic receiver on the vehicle. This magnetic receiver is capable of detecting the polarity of the two track magnets at speeds in excess of 160 km/h.

When a clear signal (green) is approached, a warning bell will sound for two seconds and the AWS indicator (on the right-hand side upright portion on the driver's console) will show all BLACK.

When a restricted signal (red, amber or double amber) is approached, an air horn will sound for three seconds, after which a brake application will be initiated. The brake application can be prevented by the driver pressing and then releasing the AWS reset button in the centre of the console. This will also cancel the air horn and cause the AWS indicator to show BLACK and YELLOW segments indicating that the signal being approached is restrictive. The indicator will continue to show this aspect until the next clear signal is passed.

Crew Compartment

A crew compartment is provided at each end of a three-car unit, for use by either the driver or guard. The driver is seated at a central driving position.

A separate seat is provided for the guard who will normally occupy one of the non-driving crew compartments in a train.

Each end of a three-car unit is fitted with headlights, marker and tail lights, and remote-controlled destination indicator.

Communications

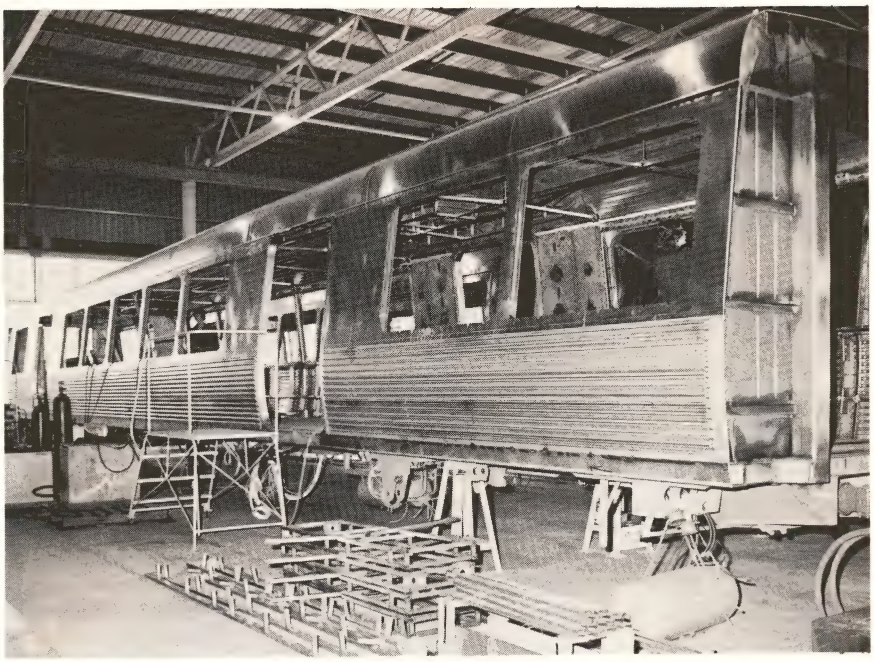
Communications between train crews and train control will be by means of a four-channel UHF high-security selective-calling radio link which will enable coded messages to be transceived as well as normal voice communication. A crew to crew intercom is also provided, as well as a crew to passenger public address system.

Performance

The electric trains will achieve a reduction in travelling time of 20-25% compared with that of present diesel-electric powered commuter trains. This has been achieved by maintaining acceleration up to 50 kmph at greater than 0.75 m/sec^2 with a top speed of 100 kmph. A braking rate greater than 1.0 m/sec^2 is also achieved.

Passenger Capacity and Comfort

A three-car unit will have a seating capacity of 248. A six-car train, which will be the normal for peak hours, will seat 496 passengers, with a 'tolerable' crush passenger load of 1,000 passengers.



The basic dimensions and capacities of the cars are:

	DM	*M*	*DT*
Length over body ends	*23.05 m*	*23.05 m*	*23.05 m*
Coupled length	*24.21 m*	*24.00 m*	*24.21 m*
Maximum width	*2.72 m*	*2.72 m*	*2.72 m*
Roof height (exterior)	*3.60*	*3.60*	*3.60*
Estimated tare mass	*42.00 t*	*42.20 t*	*34.60 t*
Seating capacity	*80*	*88*	*80*
Standing area	*22 m²*	*23 m²*	*22 m²*

All cars are fitted with two roof-mounted air-conditioning units, each of 28 kw capacity, each incorporating a single semihermetic compressor, driven by a 415 volt, 3-phase, 50-cycle electric motor. Each roof unit is a self-contained package providing the maximum accessibility for adjustments and servicing of major components and the minimum amount of dis-assembly for removal of a complete unit.

Double glazed, tinted windows are fitted to reduce glare, heat transfer and interior noise. A hopper vent section will provide emergency ventilation in the event of a total power failure.

Seats are cantilevered from the side walls to give a clear floor area for the storage of hand luggage and to facilitate cleaning. Seating is arranged in pairs with individual foam cushions and backs, covered with woollen fabric. Seat frames are manufactured from Type 301 stainless steel tubing, jig-welded to ensure interchangeability, and reinforced by an aluminium alloy stressed skin. Seat widths are 457 mm per person, with 672 mm centre aisle. Heavy-duty woollen carpet is fitted in the passenger saloons, with studded elastomer flooring in the vestibules.

Passenger-side door opening and closing is controlled from the driving position by means of electro-pneumatic circuits, but passenger activation of individual doors is necessary for the doors to open. Doors that have been opened may be either manually closed by passengers or automatically closed by operation of the crew 'close' button.

The 1,900 mm wide vestibules provide 365 mm stand-back areas clear of the door openings. Weather shields are provided at the ends of the longitudinal seats at the vestibules.

Interior linings are moulded G.R.P. panels arranged in modules of 1,750 mm long. Each saloon module consists of four panels, one each side forming the window surrounds and two ceiling panels incorporating the air conditioning distributors and the two light fittings.

Manufacture of the Cars

The contractor, Walkers-ASEA Pty Ltd, is a consortium specially formed by Walkers Ltd of Queensland and the Australian-based ASEA Pty Ltd to construct Queensland's first electric railway cars.

Walkers Ltd is an old established Queensland heavy-engineering firm specialising in shipbuilding, railway rollingstock and industrial machinery, and has previously built 526 locomotives for the Queensland Railways.

ASEA A.B., incorporated in Sweden, is one of the world's most renowned manufacturers of electrical equipment and electric railway rollingstock and has had a division established under its own name in Australia for 51 years.

The consortium won the present contract by competitive tender against eight other bids representing four other manufacturers.

The design of the cars was carried out by ASEA A.B. to specifications prepared by the Queensland Railways; and all major items of electrical equipment are manufactured by ASEA A.B. of Sweden.

The manufacture of the bogies, the fabrication of all steelwork, the construction of the cars and final fittings out are being carried out by Walkers in their Maryborough Workshops.

Other principal suppliers of equipment include Comsteel Ltd; Davies and Metcalfe; Airmate SMC; Brown Boveri Company (Switzerland); G.E.C. England; Sigma Industries Pty Ltd; Westinghouse Brake and Signal Co.; Reinforced Plastics Pty Ltd; and ANSAIR, a division of Ansett Transport Industries.

The car workshop occupies an area of 4200 m² and was specially built for this contract. The average full-time workforce involved in the project is 72. In addition, fifty other employees are involved on a part-time basis in the manufacture of components for the E.M.U. vehicles.

The first three-car unit is scheduled to be turned out of the shops at the end of May 1979 and then hauled by rail to Brisbane where it will undergo commissioning tests and track trials before delivery to the Railways.

The remaining units will be delivered progressively at intervals of three to four weeks, with the contract expected to be completed in April 1980.

Electric passenger services are expected to start in Brisbane between Ferny Grove and Darra in late September 1979.

The cost of the cars is being met by the State with some Commonwealth assistance. At 30 June 1979, it is expected that $15.6 million will have been spent, of which the Queensland Government will have provided $14.4 million.

Brown's Creek, Lismore, where Armco saved the Richmond River County Council 30% over a poured insitu concrete culvert.

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Armco steel, without question the choice for the less expensive result. If you've questions please post us the coupon.

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☐ Call me

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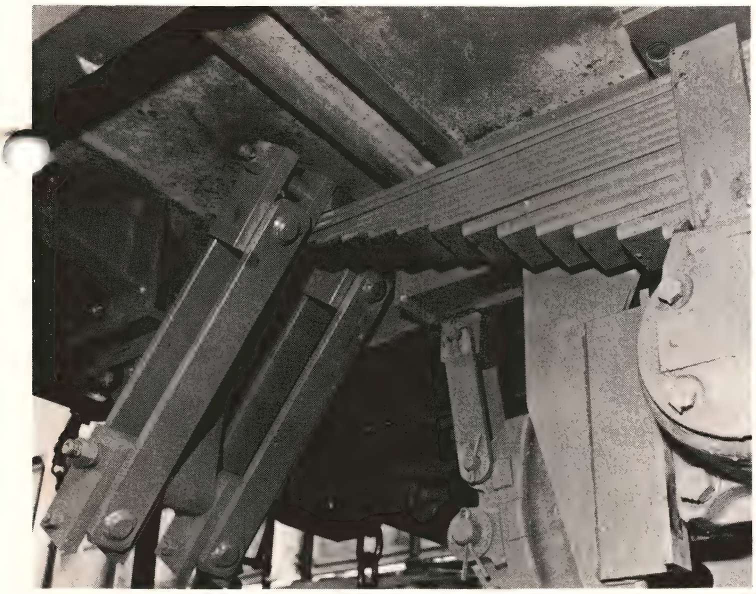
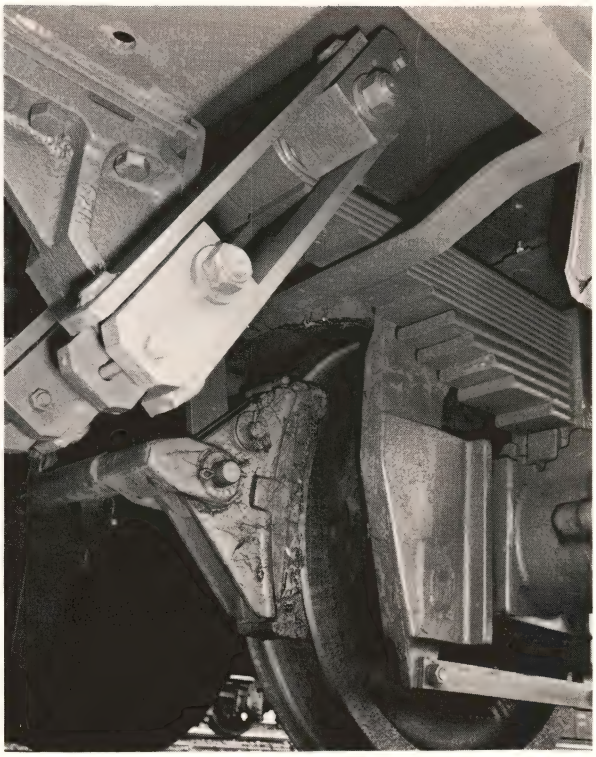
AM101





NZR's New High-Speed Four-Wheel Wagons

New Zealand Railways are building at the Addington Railway Workshops, in conjunction with the "Na" wagon production programme, fifty new "Nh" class four-wheel flat-top wagons capable of running at express speeds.

In most respects the "Nh" wagons are identical to the "Na". They have fixed steel ends, removable timber stanchions, and the usual bond chains and winches. One difference is that the "Nh" is fitted with a timber deck, bringing the floor height up to the level standard on bogie wagons. This has been done in response to requests from some NZR Traffic Branch staff who feel that a wooden deck, by exerting greater frictional drag than steel, better prevents any tendency for a load to shift in transit.

However, the major difference is in the suspension. The "Na" is fitted with the conventional, or standard shoe-type, suspension using laminated plate springs, but this arrangement is unsuited to operation at the higher speeds required by modern conditions.

As wagons have become heavier over the years and have been used to carry heavier loads it has become necessary to fit heavier springs. This has made it increasingly difficult to achieve good vertical riding qualities as springs have become stiffer and less responsive to irregularities in the track.

The traditional form of suspension makes little attempt to control lateral movement. Axle to body end float is limited by the horns which act as springs on the lateral axis, but there is no damping of this movement, with the result that at certain critical speeds vehicles fitted with this suspension become unstable. Consequently, there are quite severe restrictions on the maximum speed at which existing four-wheel wagons may run. At present NZR restricts four-wheel wagons to a maximum speed of 50 or 55 km/h, depending on the section of line.

On the "Nh" wagons a link suspension, similar to that used on four-wheel wagons by British Rail, is fitted. This uses plate springs similar to those used in the shoe suspension, but with two stiffness ranges matched to empty and loaded conditions. The vertical ride is substantially improved over all types of track at all speeds.

The most important difference between the two types of suspension is that in the new type the body is supported on the springs by long lengths which allow the body to move relative to the springs in a controlled manner. The link pins damp lateral movement of the wagon body, giving a steadier ride than can be achieved with a shoe suspension.

On the "Nh" wagons a greater longitudinal clearance is allowed between the axleboxes and horns than on conventional wagons. Coupled with the link suspension this allows the wheelsets to steer around curves, substantially reducing wear to both wheel flanges and to rails.

(Left) Experimental link suspension fitted to "Lpx" class newsprint wagon.

(Above) Link suspension as fitted to "Nh" wagon. Note size of the top bearing blocks compared with those on "Lpx" wagons.

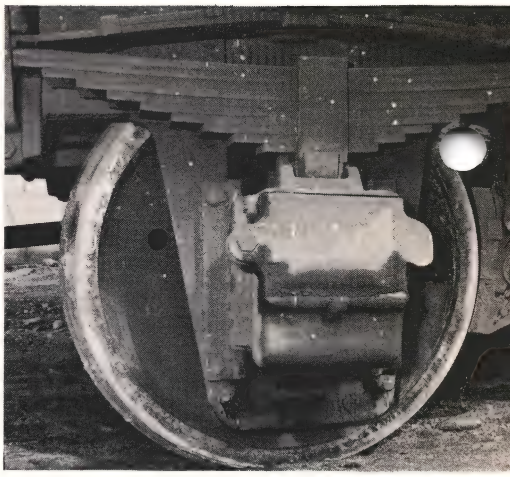
As a result of the steadier ride given by the link suspension, the "Nh" are able to run at faster speeds than existing wagons. At present they are authorised to run up to express goods train speeds, that is, 80 km/h. In future, as track is improved, it is possible that this could be increased.

If four-wheel wagons are to run at express speeds, they must be fitted with brakes capable of stopping them within the distance laid down by signal spacing — about 700 metres. The bulk of "Nh"s have two stage clasp brakes. However, five are to be fitted with SAB variable load brakes and the final one will have Girling variable load disc brakes mounted on the wheel cheeks of specially imported wheelsets. For experimental purposes the brakes will be arranged so that this wagon can be braked on all wheels or one wheel on each axle.

This will enable New Zealand Railway engineers to investigate the effect of the heat energy built up when braking. When brakes are applied, energy is removed from the vehicle in the form of heat. The heavier the brake application, the greater the mount of energy to be dissipated as heat.

Signals on New Zealand Railways are closer together than on

NZR's "Nh" class flat-top wagon fitted with link suspension for high-speed running.



A typical example of the conventional shoe-type suspension used on existing NZR wagons, in this case an "Lp" class newsprint wagon.

overseas railways using disc brakes. Vehicles must therefore be slowed more rapidly, which means a heavier rate of braking and a greater build up of heat.

The heat build up in each disc expected when one disc is fitted to each axle of a wagon is close to the limit of what is acceptable. Excessive heat substantially shortens the life of the discs. If four discs were used on production wagons, the heat build up in each disc would be within acceptable limits. The expense of fitting four discs would probably make them uneconomic, however.

The "Nh" is part of a development programme which has extended over several years. In 1975, three "Lpa" class high-siders were fitted with an experimental version of the link suspension and reclassified "Lpx". The form of link suspension fitted has proved largely satisfactory in service. Some wear has occurred in the top bearing blocks and pins because when fitting the link suspension to an existing design there was insufficient room under the floor to accommodate an ideal layout of the components. This has been remedied on the "Nh" design.

The following year two "Ks" class box wagons were fitted with a different form of high-speed suspension — the pedestal type, which uses coil springs to support the wagon, with friction wedges to damp vertical and lateral movement. The friction force produced, and therefore the damping, is proportional to the load on the springs.

In addition to the main springs, auxiliary springs are provided to cater for the wagon when lightly loaded. These sit in a spring cup resting on the upper face of the main springs and bear on the lower friction wedge. As the wagon load is increased, the auxiliary springs are compressed, transferring an increasing proportion of the load to the main springs. Under fully loaded conditions, all weight is carried by the main springs. These wagons are designated class "Ksx".

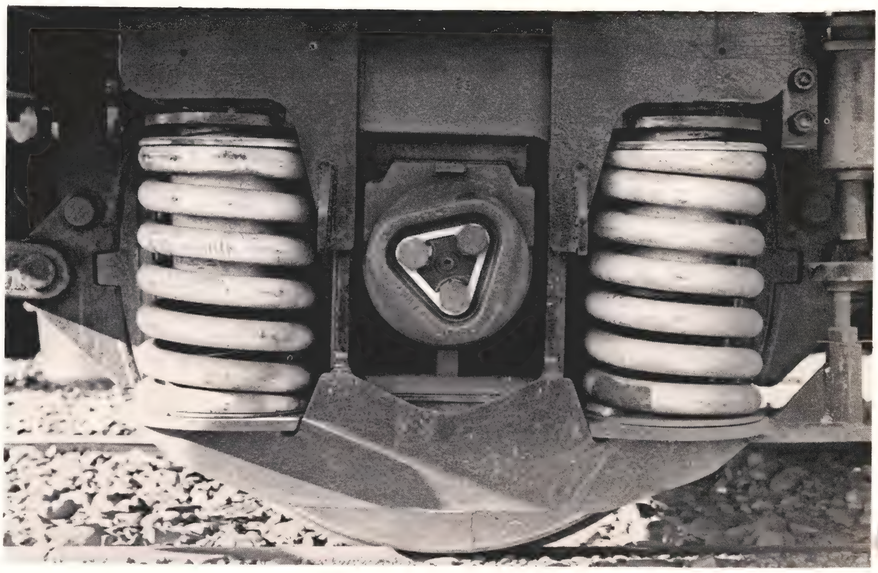
They were followed in 1977 by a high-speed four-wheel wagon of a completely new design — the "Nx" class. This also uses a pedestal suspension, but with cast components, unlike the "Ksx" wagons on which the suspension was fabricated. This wagon is fitted with stanchion pockets, high tensile steel bond chains and winches, rope lashing bars, and container twist locks: consequently it is capable of carrying a wide variety of goods in addition to 10 tonne and 20 tonne I.S.O. containers.

For experimental purposes the "Nx" is fitted with brake equipment markedly different to that used on any previous NZR vehicle. Most immediately apparent is the absence of levers, rods, brake blocks and spreaders. The handbrake is cable operated direct to each brake cylinder using "Flexball" cable hand brakes.

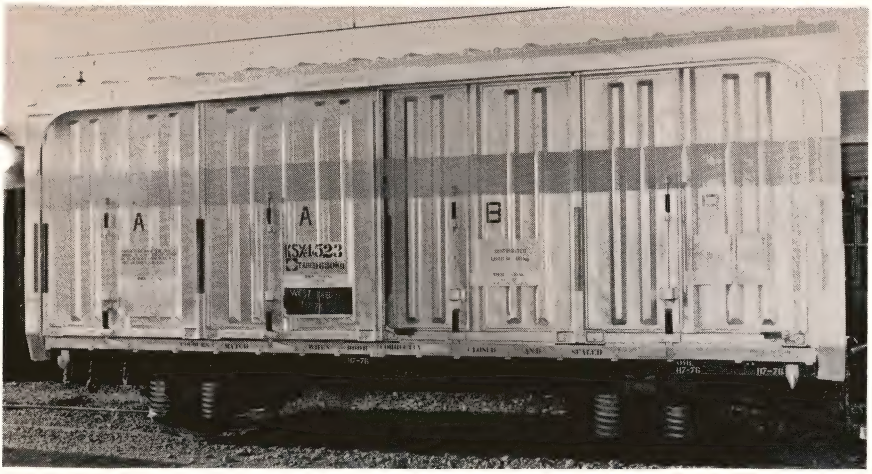
The "Nx" is fitted with variable load disc brakes. The braking force is varied according to the actual load carried so that the optimum braking rate can be achieved at all times. Two variable load brake systems are fitted to evaluate their performance in New Zealand conditions. One system uses a Davies and Metcalf-Oerlikon load sensing cell and load proportional relay valve, while the other uses a Westinghouse load weighing valve and variable load valve. One or the other system can be switched into use at any time.

When the wagon's brake pipe is pressurised, air flows through choke and check valves to two load sensing valves which are located above the inner axlebox coil springs on the handbrake side of the wagon. At the load sensing valves, the air pressure in the system is reduced proportionally to the load on the springs. This reduced air pressure pre-sets the internal pistons and control valves of the proportional relay valves.

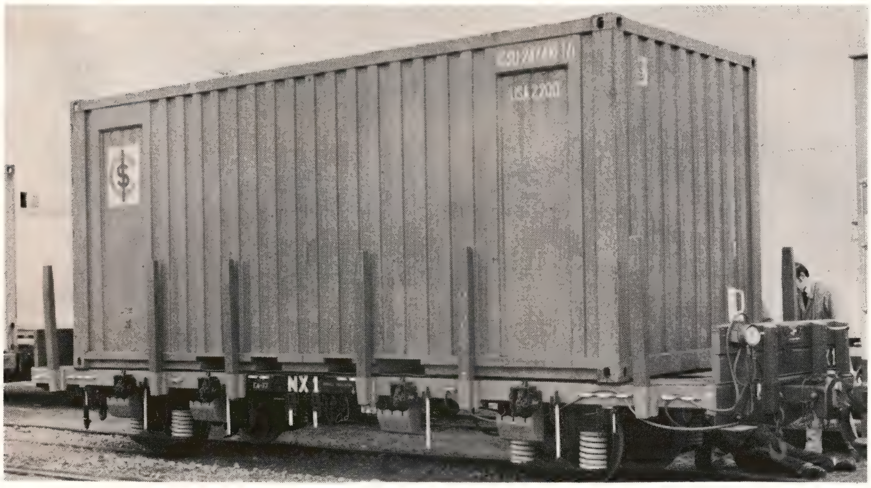
Air also flows from the brake pipe to the auxiliary reservoir



Experimental fabricated pedestal suspension as fitted to "Ksx" wagon.



"Ksx" class covered goods wagon, fitted with prototype form of pedestal suspension for high-speed running.



"Nx" class experimental four-wheel flat-top wagon with pedestal suspension for express goods train speeds.

(12.94 l capacity) and the supplementary reservoir (23.89 l capacity), charging them to a pressure of 550 kPa.

The brakes are applied by reducing the air pressure in the brake pipe in the conventional way. The triple valve senses this and makes a reduction in pressure of the auxiliary reservoir. The air removed from the auxiliary reservoir is passed to the dummy volume reservoir.

The dummy volume reservoir was not previously pressurised, therefore the air taken from the auxiliary reservoir charges the dummy volume reservoir to a pressure proportional to the reduction in auxiliary reservoir pressure. The resulting pressure in the dummy reservoir is then measured by the relay valve.

In the normal form of the relay brake system used on other modern NZR wagons, the relay valve would now pass sufficient air from the supplementary reservoir to the brake cylinder to charge the brake cylinder to the appropriate pressure proportional to that in the dummy reservoir: that is, proportional to the reduction in brake pipe pressure. If the brake rigging is worn, more air will be required to reach the same pressure; the relay valve ensures that the brake effort is the same irrespective of the amount of wear in the rigging.

Variable load brakes, such as are fitted to the "Nx", differ in one major respect from the ordinary relay brake system. If the brakes are applied while a vehicle is partly loaded, the brake cylinder will not be charged to the full pressure indicated by the reduction in brake pipe pressure. It will instead be charged to a proportion of the indicated pressure, the proportion being determined by the pre-setting of the proportional relay valve by air from the load sensing valve as already mentioned.

As a result, this braking system achieves a very high level of efficiency because it is able to automatically adjust the braking effort of the wagon to the load, so that the effort is always below the level that would make the wheels skid. With the conventional system the braking effort is the same whether the wagon is empty or loaded. It is adjusted so that the wheels will not skid if the wagon is braked while running empty: this makes the braking effort very much less than it could be for a loaded wagon.

The brake discs and calipers for the "Nx" were supplied by Davies and Metcalfe. The brake cylinder and caliper pads are one assembly, including a small slack adjuster covered with a rubber concertina. One assembly is fitted for each axle.

As the caliper pads have only 2 mm clearance between the applied and release positions, it is difficult to see if the brakes are on or off. A brakes ON/OFF indicator is fitted to overcome this. When the brakes are applied, two red flags are displayed and two green flags are displayed when the brakes are released, provided that the handbrake lever is in the rest bracket.

Some reservations have been expressed as to the vulnerability of a disc mounted on the axle centre in the event of a derailment, although this mounting position is quite common on overseas disc-braked equipment. The rate of wear on the disc brakes is very low and a pad life of about 100,000 km is expected.

NZR engineers have also been investigating the use of composition brake blocks. "Ksx" 4665 was temporarily fitted with these blocks during tests but more exhaustive trials have been conducted on Wellington multiple units, where cars "Dm" 34 and "D" 175 have been running with composition blocks for some time.

Initially the blocks were fitted without any alteration to the brake rigging, but this proved rather unsatisfactory. The composition blocks proved more efficient than the normal cast-iron ones, with the result that the cars fitted with them did most of the braking on the trains in which they were running. The wheels overheated with the excessive friction and fine cracks began to appear in the tyres.

To correct this, the brake leverage on the test units was altered to match the braking effort to that of other cars and no further trouble has been experienced. The composition blocks have proved considerably more long-lived than cast-iron ones, so could produce quite reasonable savings in maintenance costs.

(continued on p. 27)

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Public Transport in N.S.W. — Re-organisation to follow Fares and Freight Charge Rises

On 23 March, the N.S.W. Minister for Transport, Mr Peter Cox, announced that Cabinet had approved recommendations to re-organise the Public Transport Commission, to increase fares in New South Wales by an average 17 per cent and to raise freight and parcels charges by a basic 15 per cent.

He said both fare and freight-rate increases, which would operate from 22 July next, were unavoidable and totally justifiable in the context of the current economic climate throughout Australia. Moreover, despite the increase, public transport fares in New South Wales would, on average, be lower than they were when the Government took office in 1976.

The increases would also be offset by extensive initiatives in the administrative re-organisation of public transport generally, and by specific advances in fare and ticketing arrangements.

Mr Cox said two new bodies would be established to replace the Public Transport Commission, the aim being to ensure more efficient administration in New South Wales public transport, to relate more closely and better co-ordinate Government and private bus services in the transport districts, and to fulfil an election pledge by the State Government on initiatives to improve the administration of public transport and to curb the related financial deficit.

* * *

Cabinet has approved in principle a recommendation to re-organise public transport services by way of:

(a) The establishment of an Urban Transit Authority to:

- operate publicly-owned buses and ferries in the urban and inter-urban areas of Sydney, Wollongong and Newcastle;
- exercise broad policy control over private bus services and taxis in the above areas;
- ensure a proper co-ordination of Government and private urban services and for this and other purposes to have the power to enter into contractual arrangements with the private bus, taxi and ferry operators.

(b) The establishment of a separate State Rail Authority to operate all passenger and freight rail services throughout the State.

(c) The reconstitution of railway workshops under a separate Board of Management responsible to the State Rail Authority.

Mr Cox said the present Chief Commissioner of the Public Transport Commission, Mr A. S. Reiher, would take control of both new authorities — as Commissioner for the State Rail Authority (SRA) and as Chairman of the Urban Transit Authority (UTA). This would ensure full co-ordination of rail and all other urban transport services.

Mr Cox said that since assuming the transport portfolio in May 1976 he had become more and more convinced that the range of activities of the Public Transport Commission created extremely difficult management and communications difficulties.

"Whilst there have been some genuine efforts to improve the organisation of the Commission within the limits of the present structure, the Government believes it cannot continue to function as it is," he said. "I am confident that the decision to replace the Commission with two new authorities can only lend itself to more efficient administration in public transport.

"The management of the New South Wales publicly-owned system must be improved by its concentration into smaller, more accountable units. At the same time, better machinery will be established for co-ordinating, rationalising and integrating the Government-owned and private urban services — an integral part of the public transport system."

The Urban Transit Authority, a statutory body under the direction and control of the Minister for Transport, will comprise a chairman (also head of the State Rail Authority), a full-time Managing Director, a part-time Commissioner for Motor Transport (for regulatory aspects and day-to-day administrative work associated with private buses and taxis), the chairman of the Urban Transport Advisory Committee (part-time), three part-time representatives of the Bus Proprietors Association, the Taxi Council, and the employees, respectively, and, also on a part-time basis, the chairman of the Commuter Council.

The State Rail Authority will be headed by a single Commissioner, supported by a Managing Director and responsible for a staff in excess of 42,000.

Summarised, the basic effect of the re-organisation will be to:

- remove from a single organisation the responsibility for the operation of urban passenger transport *as well as* non-urban freight and passenger transport. This is consistent with organisational patterns in the United Kingdom, Europe and North America;
- improve the efficiency of transport services administration and provide for more effective communications both inside and outside the service;
- better co-ordinate the Government and private bus and taxi services in the transport districts;
- improve the management of the Government transport system through its concentration into smaller, more accountable units;
- integrate, co-ordinate and rationalise the Government-owned and private urban services;
- extend to the Urban Transit Authority the option to enter into contracts with private operators, creating the possibility of taxi services over off-peak bus and rail routes — in line with overseas trends;
- modernise, rationalise and improve the efficiency of rail workshops.

Mr Cox emphasised that the re-organisation of public transport services was a major task which, by its very nature, could not be accomplished overnight.

The Government also recognised that the various proposals would need full and frank discussion and consultation with the unions.

"It is quite clear, therefore, that the Public Transport Commission will need to operate under the present arrangements for a considerable time before the overall re-organisation takes place," he said.

*   *   *

Public Transport Commission fares will be increased by an average 17 per cent throughout New South Wales from July 22 next. However, the increases will be offset by two major initiatives in fare and ticketing procedures:

(1) the re-introduction of yearly rail tickets and the extension of the yearly ticket system to bus, ferry and intermodal travel;

(2) the introduction of intermodal fare and ticketing arrangements and new forms of bus weekly tickets based on zones.

The cost of a yearly ticket will be assessed at forty times the weekly fare, a definite incentive for the purchase of this ticket; and in addition, the Commission has arranged with the various trading banks for the cost of yearly tickets to be spread over a period of ten months.

This instalment plan will carry a service fee of 5 per cent to cover both the bank charge and the Commission's administrative costs. Thus the time-payment scheme for yearly tickets will involve a total cost equivalent to 42 weekly tickets.

"I believe" said Mr Cox, "that the instalment plan together with the fare reduction on offer will make the purchase of a yearly ticket a very attractive proposition."

Further, in a departure from the current point-to-point weekly bus ticket system, a zonal system for bus and intermodal periodical tickets would be introduced, Mr Cox added. The fare structure incentives involved in the associated division of Sydney bus services into an inner and outer zone would be of great benefit to bus commuters generally.

A publicity campaign advising commuters of the benefits of the zonal system will be launched shortly by the Public Transport Commission.

Mr Cox regretted having to move to increase public transport fares, but no realistic alternative existed. He said the State Government's decision to reduce fares by an average 20 per cent in June 1976 had been a resounding success.

Moreover, the reduction meant that the increases proposed from July 22 would see average public transport fares still set below those applying in 1975. The Government had managed not only to reduce fares by 20 per cent on election, but also to hold them at that level for an unprecedented three years.

Up to June 1978 public transport patronage had increased by more than 10.5 million passenger journeys, as opposed to a loss of almost 60 million journeys in the corresponding period from 1974 to 1976.

Mr Cox added that the upsurge in patronage and the associated reversal of a massive downturn in passenger journeys was a direct result of the Government's programme to upgrade and revitalise the public transport system.

He said the decision to increase fares from July was taken in the context of the need to attack the public transport deficit and in the light of the rise in the consumer price index since fares were first reduced: "In that period the index has risen by no less than 33 per cent, which is almost twice the size of the average public transport fare increase proposed."

*   *   *

PTC freight and parcels charges will increase from July 22 as follows:

(a) wheat and grain — 11 per cent

(b) livestock, wool and refrigerated goods — 20 per cent

(c) by-law rates for freight and parcels generally — 15 per cent.

Mr Cox pointed out that the decision to increase freight and parcels rates was taken on the basis of realistic pricing policies. Since the last increase in these rates, in October 1977, the Consumer Price Index had risen by approximately 15 per cent while the Commission's wages bill had increased by almost 17 per cent.

"In the light of those increases, the decision for a general increase of 15 per cent in freight and parcel rates is fully justified," he said. "As an example of the existing disparity, I am bound to point out that the current freight rate paid by woolgrowers is less than the rate determined in 1966."

Mr Cox said ample justification for the increase existed in the fact that the Commission's freight services in the 1978/79 financial year were expected to incur a loss of $166 million. "This level of support from the general taxpayer for what should be a self-supporting business function of the Commission simply cannot be justified," he said.

Centralized Traffic Control keeps constant watch on bullet train operations, and can take over actual operation in an emergency.

Japanese Rail faces fearsome finance problems

Japanese National Railways (JNR) concluded its 1977 fiscal year in March 1978 with a deficit of Yen 833,900 million, the third largest in an unbroken series of annual deficits every year since 1964.

But even before that gloomy figure was released by the auditors in August, JNR and the Japanese Government had announced yet another in a series of plans for JNR's financial rehabilitation. This one is designed to get the railway's finances in order by not later than 1985.

How likely is it that this latest plan will resolve the financial problems that have plagued JNR for almost a decade and a half? And how did the once-profitable JNR fall into financial hard times?

A wide array of problems has contributed to the now-chronic deficit, but perhaps the most important has been the necessity that the National Diet approve any revisions to JNR tariffs. The result of this politically unpalatable step has been long-delayed tariff adjustments that have typically fallen into the too little-too late category in attempting to keep JNR abreast of inflationary trends.

Further aggravating the generally inadequate earnings that have come out of this cumbersome tariff procedure have been the effects of the exceptionally low rates historically maintained for such social services as commuter or student transportation.

Another sizeable slice of the annual JNR deficit has been generated by an extensive network of unprofitable local lines. In 1976, for example, local lines totalling 41% of JNR route-km earned only 4% of total operating revenues, but accounted for 25% of the system's annual operating deficit.

the most unprofitable route of all, the Biko Line on Hokkaido, cost Yen 2,817 to operate for every Yen 100 it earned. Closure of these uneconomic lines has proved largely impossible for political reasons. Indeed, new local lines are still being built and added to the JNR system.

More recently, freight service losses have contributed a rapidly growing share of the annual deficit. Since 1970 JNR has lost more than a third of its annual freight tonne-km, but has been unable to rationalise its freight service resources rapidly enough to keep costs in line with revenues. By 1977, freight losses were responsible for more than half the JNR deficit.

Many railway problems are now universal. Japan's difficulties are very similar to Australia's. This article appears by courtesy of "International Railway Journal".

Labour Costs

Overshadowing all areas of JNR operations is the mounting problem of labour costs and productivity. Until recently, steady growth in traffic and modernisation of equipment and facilities had enabled JNR to show continuing gains in its employee productivity. The railway was able to keep personnel costs within fairly tolerable limits even though wages increased more than twice as fast as JNR rates.

Now, however, as traffic has begun to fall off, JNR has been unable to rationalise its operations and reduce staff rapidly enough to match. As employee productivity has begun to fall, the labour cost share of JNR's operating expenses has begun to show an ominous growth. Between 1974, when JNR productivity reached its peak, and 1977, personnel costs went from 45 to 60% of total operating expenses, and labour costs are now consuming more than 80% of total JNR operating revenues.

Development of the new financial rehabilitation plan — the fourth one that JNR has had — paralleled discussion and Diet approval late in 1977 of two bills that will have a major impact on efforts to restore the system's financial health. One of these was a long-sought amendment to the National Railways Tariff Law which gives JNR much greater flexibility in adjusting its tariffs, while the other has amended the

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Japanese National Railways Law to widen the scope of the enterprises in which JNR may invest.

In a proposed "Basic Course for JNR Rehabilitation" presented to the Diet in the debate on the two bills, and a subsequent "Basic Policy" approved by the Cabinet, the Japanese Government has established three basic "guiding principles," or areas of effort, for JNR's financial recovery. These broad groupings include tariff revision, corporate efforts by JNR itself, and financial aid by the Government.

In many cases, the specific measures to be taken will simply be a continuation of rehabilitation programmes adopted under previous JNR recovery plans, while others are still no more than generalised concepts. During 1978 and 1979 JNR and the Government will develop more specific plans for execution during the 1980s, with the target year for completion of JNR's financial rehabilitation now set as "not later than 1985."

The foundation for JNR tariff revision is the amended Tariff Law, which now permits JNR to set its own tariffs, subject only to the approval of the Minister of Transport. An important limitation on this greater rate-making freedom, however, confines any increase to the rate of inflation in wage and commodity prices. So, JNR cannot solve its deficit problem simply by raising tariffs.

In any event, in setting out to revise its tariffs JNR now seems to be much more keenly aware of the practical limits of what it can do than it was a few years ago. As recently as 1976 JNR persuaded the Diet to approve a 50% increase in its rates. The effect of that abrupt increase was a sharp downturn in virtually every category of JNR traffic. Even the Shinkansen system showed a loss in traffic after more than a decade of uninterrupted growth.

"JNR is no longer a monopoly industry and is exposed to keen competition from other modes of transport. These are the conditions which make further tariff increases difficult, but we are obliged to raise them, even so," said Tomoo Kagayama, director of JNR's corporate planning department and a newly-appointed member of the board of directors.

"We have to think of many different ways of increasing tariffs, rather than the previous flat 'across-the-board' increases," continues Kagayama.

He cites JNR's tariff increase of last July — the first to take effect under the new law — as an example of this approach, which takes into account the nature of the traffic and the competitive situation, as well as increased revenue needs.

While the overall increase averaged about 14.8%, individual increases varied widely, going as high as almost 21% for some of JNR's discount fares for workers and students. But recognising the strength of its competition, JNR held the increase for its troubled freight business to only 5%. "The effect on traffic," says Kagayama, "was negligible."

Increasing Efficiency

At the heart of JNR's corporate efforts at financial recovery must be a continuation of its already extensive efforts at rationalisation and increased efficiency, such as in the freight service programme. But in its "guiding principles" for JNR's financial overhaul, the Government has also called for a new vitality and innovation on the part of the railway's management. What seems to be wanted here are new ways to market and price JNR services more competitively, and new ways to build profits.

The last few years have seen some encouraging beginnings of a more imaginative approach to marketing JNR services. Late last year, for example, the system began selling special combined tickets at its stations around Tokyo that include both a discount rail fare and admission to a Tokyo "grand sumo" tournament and plans comparable promotions for tournaments at other cities.

In cooperation with local travel bureaus the railway has been selling similar combination tickets for such diverse excursions as a visit to a beetle farm for school children, fruit picking at an orchard, fishing trips, or outings to a hot springs resort. Travellers on JNR's long distance trains now get free souvenirs of their trip, bearing the train's name.

A major opportunity for developing new JNR revenues was opened up by the late 1977 revision of the JNR Law. Previously, JNR was restricted to investment only in activities closely related to its primary transportation purposes, such as bus terminals and station facilities. Now, JNR can invest in commercial activities away from its transportation facilities, limited only by the requirement that users of the new facilities must also be users of JNR services. Under this new freedom, JNR is now planning investment in such activities as hotels, shopping centres, sports facilities, amusement parks and other leisure activities, utilising some of the 2,000 hectares of idle land that it owns.

An Assets Utilisation Council set up by JNR president Fumio Takagi has helped the railway identify new projects. Typical of these enterprises are a new swimming pool being built by a subsidiary corporation near Tokyo's Yotsuya Station, which should bring in Yen 15 million annually in land rental to JNR, or a new tennis club near Kichijoji Station in Tokyo, which earns Yen 27 million a year in land rentals. By 1985, JNR hopes to be earning as much as Yen 100,000 million annually from commercial enterprises of this sort.

Of all the areas where JNR is going to require some form of government financial help, none is more pressing than the problem of uneconomic local lines. A logical step, of course, would be simply to close the most hopeless of these lines, in the manner of British Rail's Beeching Plan of the early 1960s. But in Japan this approach does not seem likely to succeed.

"About ten years ago JNR had a 'Beeching Plan'," remarks Mr Kagayama. "We planned a local lines reduction of 3,000 km. But so far we have abandoned only 200 km of that plan because of strong opposition from the people along the lines."

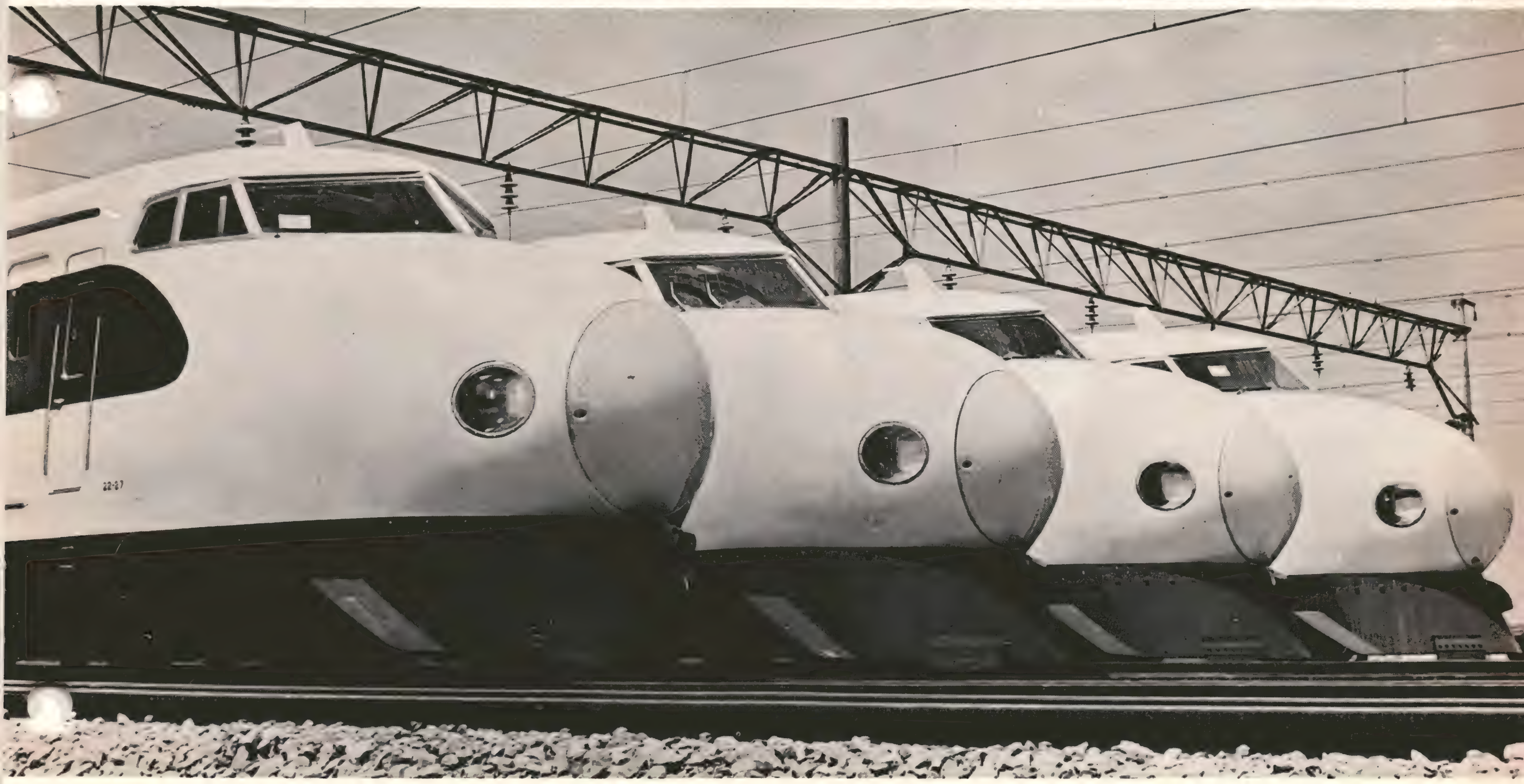
Even so, JNR has not given up its efforts to discontinue at least some of these lines, and the subject is among those being discussed by a new governmental Transportation Policy Council. But given the political difficulties in the closure process, it seems inevitable that still greater government subsidies for these operations — rather than mass closures — are going to be a part of the solution to JNR's deficit problem.

The new plan acknowledges as much. JNR is charged with a requirement for further efforts to raise the efficiency of these operations, but public financial aid is seen as a requirement when JNR incurs a "structural deficit" beyond what is considered the limit of its own responsibility.

Along with the problem of dealing with local lines losses goes the question of Government policy towards construction of still more of these lines. Currently, the Japan Railway construction Public Corporation is building about 47 narrow gauge lines, totalling 2,000 km, which JNR will be obliged to operate as they are finished. While many of these lines doubtless will serve real needs, the decision to build is often a largely political one, and many local lines will have little prospect of economic operation.

Now, future policy towards construction of these new lines has been taken up by the new Transportation Policy Council. "We hope these will be classified into lines needed, and lines not needed and construction halted accordingly," Kagayama told IRJ.

Opposite: One of the world's fastest trains passes Mt. Fuji. Below: A super-express on the Tokaido line. Bottom right: Super-expresses in the Tokyo marshalling yard. (Illustrations by courtesy of the Japan Information Service, Melbourne).



Scenic — but, Shikhansen apart, JNR passenger trains lose money.

"If some lines are considered necessary, though uneconomic JNR expects the Government to subsidise their operation."

New Policies

JNR is looking, too, for new policies from the Council — and Government help — in other areas of financial difficulty that it considers to be largely "structural" problems created by past Government policies. Among major problem areas are the traditional policy of providing large discounts on commuter tickets; interest payments on loans necessitated by the deficit; and a looming problem of large-scale retirement bonuses that will become payable over the next decade as some 200,000 members of the JNR workforce reach retirement age en masse.

The solution to the overall problems of labour cost and productivity certainly lies in a continuation of the wide range of rationalisation and automation programmes that have characterised JNR efforts for some time.

In the labour intensive area of ticket sales and fare collection the use of automatic ticket vending and collection equipment has become increasingly common on JNR's narrow gauge lines, and automatic vending machines even for reserved seat Shinkansen tickets have now been introduced. About half of JNR's local lines stations are now unmanned, and the railway is looking for ways to further increase their number. Many local trains are now being operated with only a single driver and conductor. And JNR's drastic revamping of its freight operations continues apace.

Even though JNR is firmly committed to a policy of manpower rationalisation only as normal attrition reduces the size of the work force, its militant unions have traditionally opposed these efforts, typically calling instead for the status quo and a greater level of government financial aid.

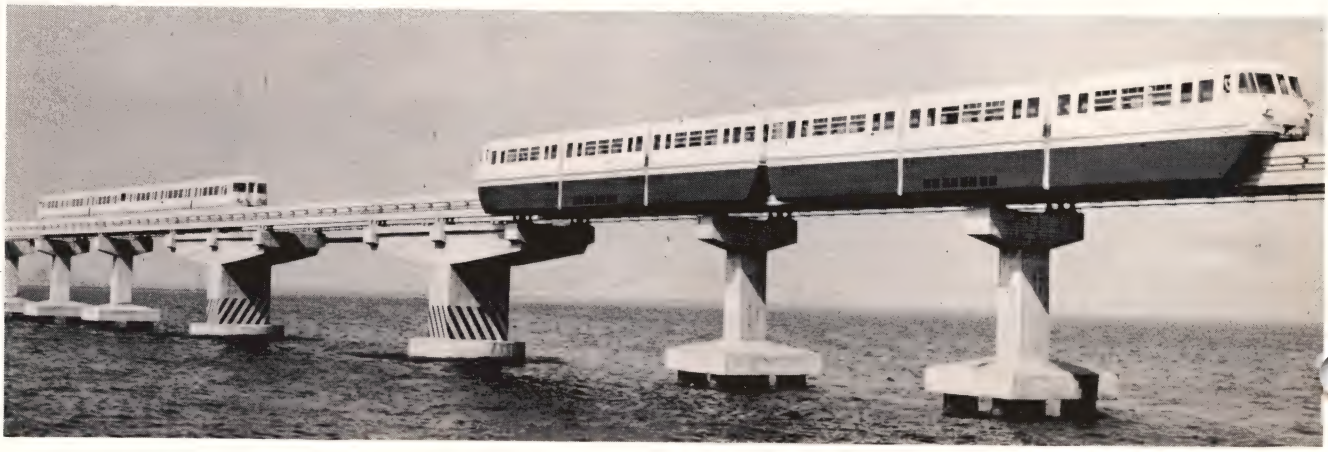
Strikes in opposition to JNR's programme to rationalise its freight operations have disrupted JNR service on several occasions over the past two years. But even here, JNR's Kagayama sees some hope. "Although the overall policy of the unions to oppose rationalisation will not change the union attitude is more understanding compared to several years ago," he said.

At this point, with much of the specifics as to what JNR — and the Japanese Government — will do to resolve JNR's deficit dilemma still not worked out, it is far too early to predict that this latest rehabilitation plan is likely to succeed where previous plans have failed. But in the revised laws that give JNR a new flexibility in fare adjustment and non-transportation investment, the railway now has two important new tools that it lacked previously.

The system already has a well-developed programme for rationalisation and automation, and the impending retirement of nearly half the present work force over the next decade or so affords JNR a rare opportunity to achieve the necessary personnel savings without major labour turmoil, provided, of course, that its unions can be persuaded to at least acquiesce to the changes. There also seems to be much greater Government acceptance of the need for subsidy of those JNR operations which are considered socially desirable, even if uneconomic.

If JNR management can now put these favourable possibilities together with new vitality and innovation in its pricing and marketing efforts, and can effectively exploit the new opportunities that will come when the Seikan Tunnel and Shikoku bridge projects complete an unbroken rail system extending to all four of Japan's main islands, the prospects are bright for both financial reform and a new era of JNR growth.

The Tokyo monorail — the world's first for mass transportation — links the international airport and downtown Tokyo in 15 minutes. (Illustrations by courtesy of the Japan Trade Centre, Melbourne).



Railway Report.

From Australian Timken Proprietary Limited

(Advertisement)

No. 2 May 1979

Timken 'AP' bearings help cut fuel costs

Timken "AP" (all purpose) bearings offer railways an excellent opportunity to reduce fuel consumption.

Late last year, The Timken Company began marketing Timken "AP" bearings with low torque seals, on a worldwide basis.

As a result, railways can derive meaningful energy savings without having to sacrifice sealing capability and bearing service life.

The Timken low torque "AP" bearing seal also offers railway users a significant long-term cost advantage by reducing equipment downtime for bearing servicing.

The Timken low torque seal offers equilibrium operating torque at least as low as any other available seal after only a short break-in period.

The seal effectively excludes dust and water and at the same time retains bearing lubricant.

The low torque seals are dual lip and have bi-rotational elastohydrodynamic (EHD) mechanisms.

The Timken Company has been marketing an EHD seal to railways for about 10 years, but the latest development combines high performance with low torque.

The seal is precision-moulded from elastometric compounds which have been developed specially to provide superior wear resistance and to withstand degradation by the lubricant.

The dust lip is a major design feature. It maintains a positive interference fit on the rotating wear ring. This enables the lip to give a measure of extra protection by excluding dust and water from the prelube buffer.

The EHD configuration of the fluid sealing lip has been developed so that the rotation of the seal wear ring against the lip acts to prevent the escape of lubricant.

The fluid lip has excellent force retention which improves sealing efficiency and extends seal life.

The contamination-free environment which the dust lip provides also prolongs the service life of the fluid sealing lip and maximises reliability.

The Timken low torque "AP" bearing seals are subjected to no fewer than nine separate tests to ensure they meet the required standards.

The Timken Company's seal qualification programme has traditionally consisted of five tests:

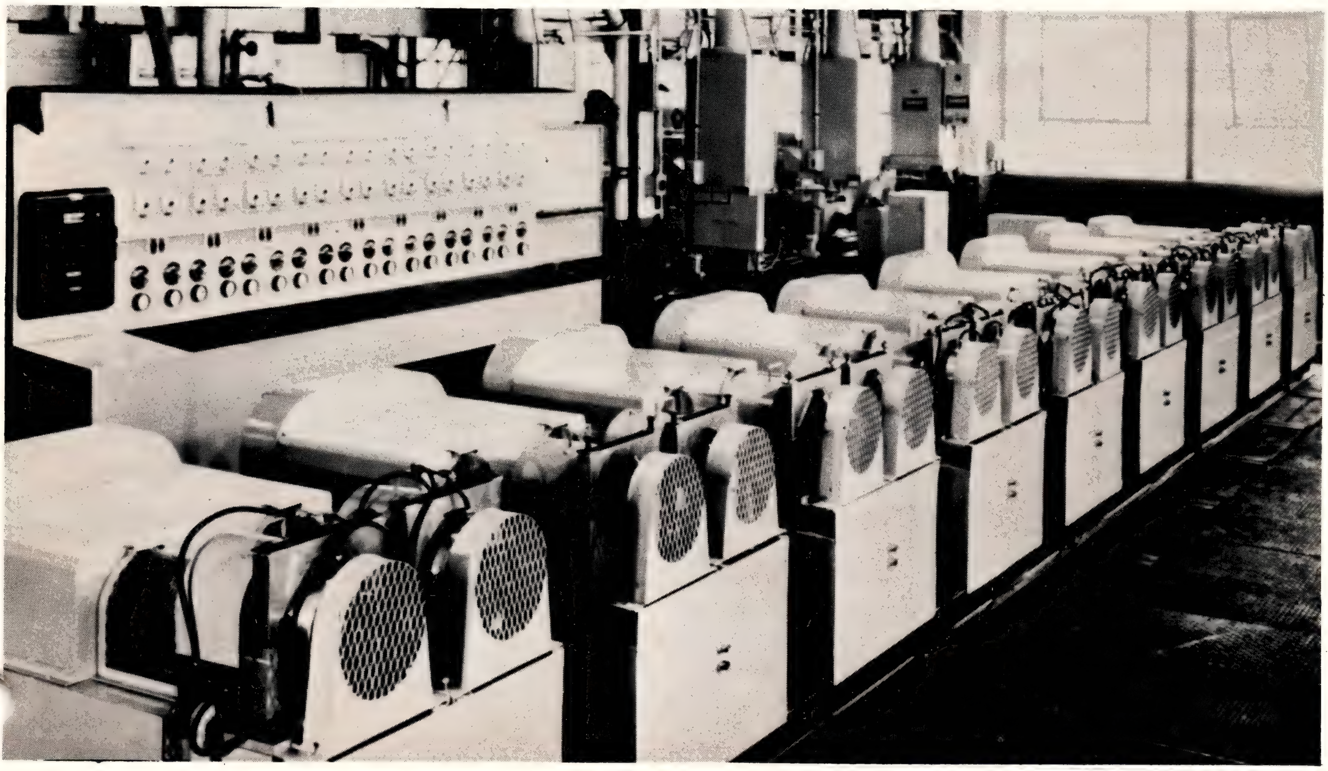
- Audit — to check compound and leakage.
- Compound — to evaluate heat and wear resistance and leakage after extended service.
- Geometry — to evaluate seal lip and mould design.
- Eccentricity — to assess seal lip "followability".
- Life — for ageing and lip force retention.

As the low torque seal development programme progressed, The Timken Company added four new tests. These are designed to make absolutely sure that seal performance would not be sacrificed in achieving its energy saving benefits.

The four new tests are:

- Dust exclusion — an effective measure of positive dust lip contact and adequate force of the fluid sealing lip.
- Water exclusion — the bearing seal must be watertight when it is submerged in standing water.
- Vibration — checks lubricant leakage under service conditions.
- Torque test — measures equilibrium torque under service conditions.

Test rig for low torque seals.



The inside story on case-carburising

The Timken Company case-carburises all of its cups and cones and rollers during manufacture to get optimum service life, particularly in heavy duty railway applications.

All anti-friction bearings are subjected to continuous loads, which deform bearing surfaces while the load is applied and cause fatigue.

Millions of intermittent fatigue compressions may cause spalls or pits on the surfaces of the rolling elements which, in turn, may ultimately end the life of the bearing.

Hardness in steel is controlled by carbon content. If carbon is introduced during the heat treatment of cones, cups and rollers, the depth to which the carbon penetrates can be controlled precisely — and the outer case of the component is hardened.

The *core* of the component retains the properties of high alloy steel: extremely tough but resilient. This allows bearings with case-carburised parts to sustain substantial shock or overloads without distress.

Typical transverse cracking in through hardened bearings.

The case-carburising process produces residual compressive stresses in the case which ensures maximum reliability and performance by providing high wear resistance, high resistance to fatigue and cracking during fitment, and low potential for through-the-race cracking after the onset of fatigue.

Some makers of tapered roller bearings use through hardening high carbon steels in which carbon is introduced when the steel is melted.

This treatment may be suitable for other anti-friction bearing types, especially deep groove ball bearings, but The Timken Company has found that case-carburising is more suitable for tapered roller bearings which are subject to frequent high radial and thrust loads.

As a specialist manufacturer of tapered roller bearings, Australian Timken uses the case-carburising process. Through extensive tests, Timken Company engineers know that case-carburised steels give maximum resistance to wear and metal fatigue, and this process is now used in all Timken Company manufacturing plants.

Hamersley buys 'XP' bearings

Hamersley Iron Pty Ltd has placed an order for 1000 Timken Class F "XP" railway bearings.

The bearings, manufactured in the US, will be supplied and serviced by Australian Timken Pty Ltd.

Hamersley is the first major railway in Australia to buy significant quantities of these bearings.

The Timken Company developed the "XP" (extended performance) railway roller bearing in direct response to growing world-wide demands for extended reliability in railway equipment.

The "XP" bearing has a dramatically extended operating life compared with other ore car and freight wagon bearings.

The bearing has been designed to operate without lubrication or reconditioning for one million km or for 10 years, whichever comes first.

It will last for as many wheel changes as required, provided the one million km or 10 year period is not exceeded.

Naturally, this amounts to a significant reduction in railway operating costs, in addition to the increased reliability offered by the "XP" concept.

Other types of bearings must be remanufactured each time a wheel is removed from the axle.

The "XP" bearing need not be remanufactured until the one million km or 10 years of service have elapsed.

Timken "XP" railway bearing

This is an obvious advantage to Hamersley's Pilbara railway, where ore cars are required to carry heavy loads over long distances and in extreme operating conditions.

An extensive research programme in the USA preceded bearing development. It included an 18 month study of bearing performance on 27,000 freight wagons.

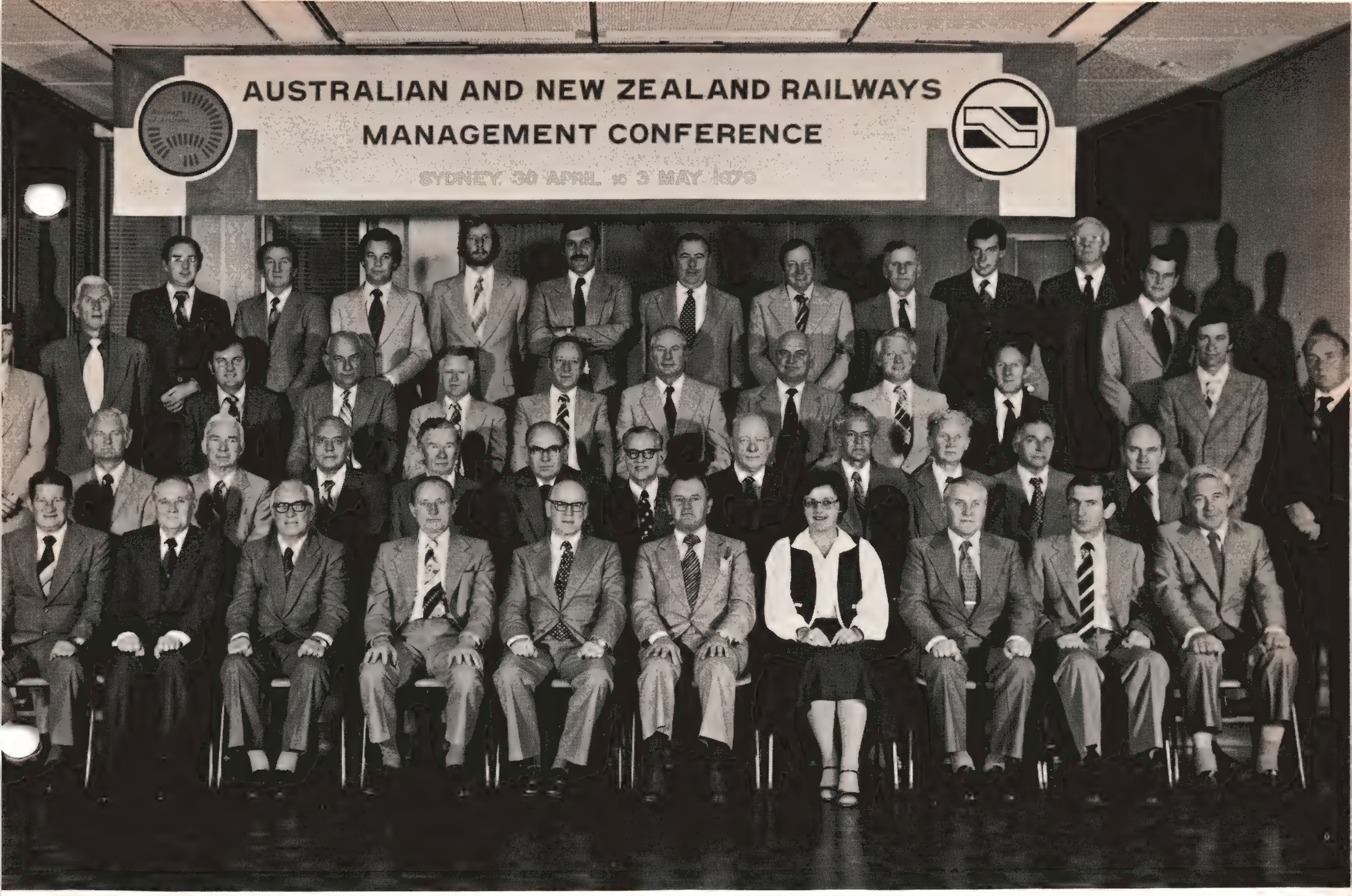
An important phase of the "XP" bearing's development concerned component research.

During the programme nine bearing features were developed:

- recessed and bonded seals
- a fitted backing ring
- a new cap screw thread lock
- an increased cone fit
- no lube fitting
- use of an optimum type and amount of lube
- improved surface finish
- an improved axle end cap
- omission of holes in the outer seal wear ring.

Field tests have substantiated what has been learned in the laboratory about "XP" bearings and some particular causes of having to take wagons out of service for bearing maintenance have been virtually eliminated.

(Advertisement)


AUSTRALIAN AND NEW ZEALAND RAILWAYS
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J. Jeffcoat, *Chief Mechanical Engineer & Workshops Superintendent* (QLD)
A. W. Weeks, *Chief Marketing Manager* (VR)
K. N. Newton, *Director of Marketing* (NSW)
N. J. Gazzard, *Executive Director* (ROA Committee)
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H. N. Walker, *Chief Engineer* (QLD)
R. D. Christie, *General Manager, Way & Works Branch* (NSW)
A. W. Newton, *General Manager, Mechanical Branch* (NSW)

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L. Pitsikas, *Chief Mechanical Engineer* (WAGR)
L. C. Rolls, *A/Chief Mechanical Engineer* (VR)
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B. W. E. Copley, *Marketing Manager* (WAGR)
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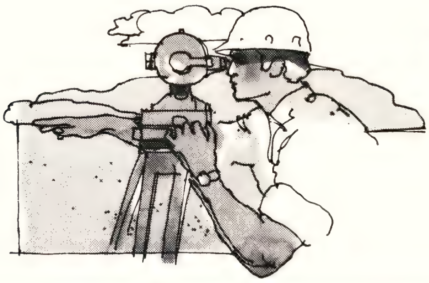

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Tenders and Contracts

Tender invitations include:

PTC — Spec. 468, closing 27 June. Provision of a 60-channel 1700 MHz trunk radio relay system between Broadmeadow and Werris Creek.

VR — Tender No. 10671, closing 23 May. Supply of fork lift trucks. Where applicable, preference will be given to a tender received from an industry approved as a Decentralized Industry by the Minister for State Development, Decentralization and Tourism.

VR — Contract No. 64679. Manufacture, supply, delivery, installation and commissioning of communication systems and apparatus for the Metropolitan Train Control Centre (Metrol), Melbourne. Closing date has been extended from 2 May to 23 May.

VR — Contract No. 64699, closing 11 July. Supply of six 2.5 MW silicon diode rectifier assemblies.

VR — Contract No. 64700, closing 11 July. Supply of five 2.5 MW rectifier transformers.

Recent Contracts include:

QR — Construction of building structures and services for Loco Servicing Depot, Callemondah-Gregory Project: Jennings Industries Ltd ($2,160,685).

QR — Construction of two railway bridges, over Neerkol and Stuart Creeks, Central Line: Pearson Bridge (Qld) Pty Ltd ($448,489).

QR — Earthworks, culverts and bridge-lifting, for twelve regrades, Duchess to Mt Isa: Thiess Bros Pty Ltd ($384,296).

QR — Construction of culverts and earthworks for elimination of twenty timber bridges, Stuart to Woldston: Townsville Earthmoving ($349,808).

QR — Erection of, and alterations to, buildings at Jilalen-Norwich Park Project: T. F. Woollam & Son Pty Ltd ($341,900).

QR — Design, manufacture, supply and delivery of sixty cast steel freight bogies for Class "MO" molasses wagons and Class "WO" water wagons: Bradford Kendall Foundries Pty Ltd ($320,444).

QR — Construction of earthworks and culverts for deviation at Long Gully, between Charters Towers and Hughenden: Cyril Golding Earthmoving Pty Ltd ($251,069).

QR — Construction of culverts and earthworks for elimination of fifteen timber bridges, Wyandra to Cunnamulla: Cyril Golding Earthmoving Pty Ltd ($218,821).

(continued from p.13)

On the prototype forms of pedestal suspension, more particularly on the "Ksx" wagons, some trouble has been experienced with the saddle wearing on the body housing. This is largely the result of minor inaccuracies in coil springs and body housings. The ends of the springs are not quite square to the body of the spring and the housings are not quite square to the wagon, with the result that the saddle can flop on an angle to the body on straight track. It is expected that this can be overcome by extending the body housing further downwards.

Design work will begin shortly on a new type of high-speed four-wheel wagon, the "Nk" class flat-top. The form it will take has yet to be finalised, but will be influenced by experience with the experimental wagons.

No decision has been made on the type of suspension to be adopted. The link suspension gives a good overall ride, and although the vertical ride index is not ideal this becomes less important as track is upgraded. The pedestal suspension gives a good ride, but present designs are unable to steer around curves, resulting in increased flange and rail wear compared to the link suspension. Both are superior to the shoe type.

The "Nk" will have a substantially higher axle-load than the "Nh", preventing the use of the existing design of link suspension. If the standard wheelsets are used they will impose severe constraints on the design. The wheels and axle bearings determine the location of the springs. If the heavier springs needed for the "Nk" were fitted into the space available with the standard wheelsets, it would be necessary to abandon the traditional horns in favour of traction rod location of the axleboxes.

On the other hand, if, as seems likely, the "Nk" is fitted with disc brakes, it will have to be fitted with non-standard wheelsets. These could be fitted with longer axles and retain horn location of the axleboxes.

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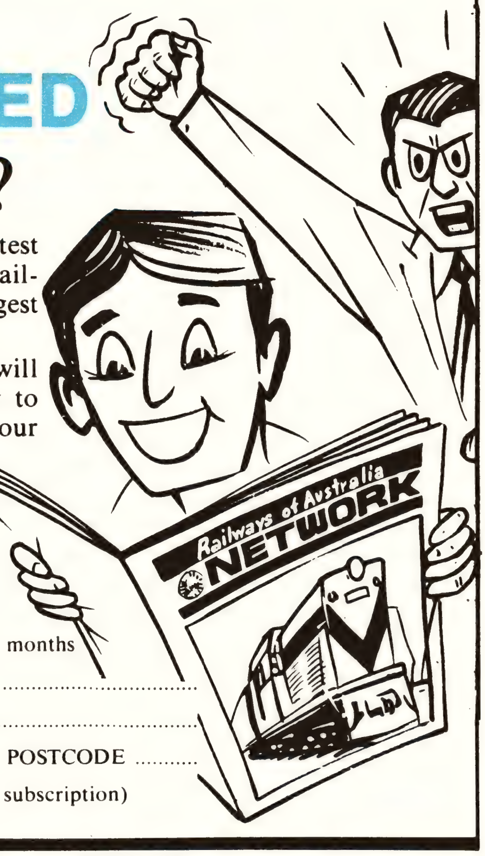
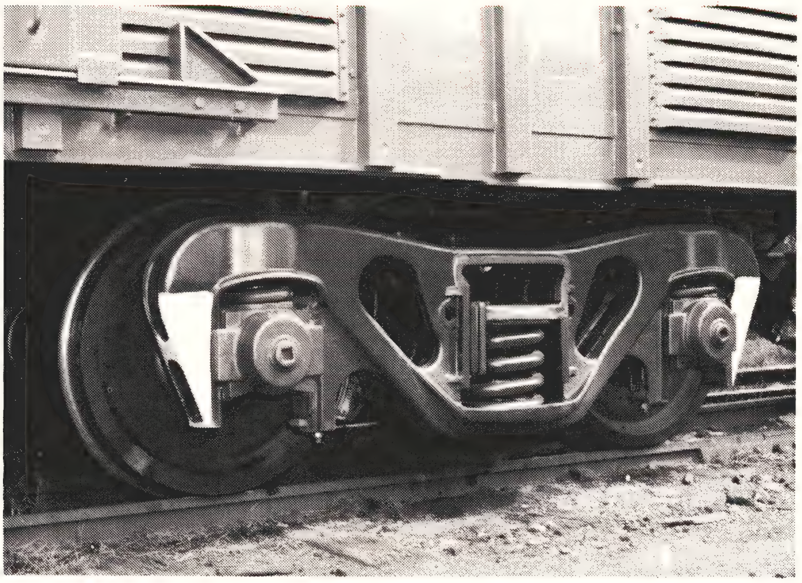


SPRINGS FOR RAILWAY ROLLING STOCK.



Fast freight bogie with Pioneer Springs and Wear Plates as supplied to the New South Wales Public Transport Commission.

Pioneer supplies springs and wear plates for the fast freight bogies and locomotive suspension units that are used to transport goods and passengers over mainline tracks at speeds up to 125 km/hr. Pioneer's reputation for reliability has spread all over the world. Transport engineers everywhere rely on the consistent high quality of Pioneer springs for suspension units.

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The Window Seat

Mr Ian McGregor, C.Eng, F.I.Mech.E., F.N.Z.I.E., M.C.I.T., took up his appointment as New Zealand Railways' Deputy General Manager on March 28. He joined Railways as an apprentice fitter at Hillside Workshops, Dunedin in 1940 and was appointed to the Chief Mechanical Engineer's Office in Wellington in 1948 shortly after graduating in Mechanical Engineering.

In 1950 he was appointed Mechanical Engineer in the Wellington office and transferred to the Auckland District Office three years later. Twelve years later he was appointed Advisory Engineer to the New Zealand High Commission in London in 1965.

He returned to New Zealand in 1970 to take up the position of Mechanical Engineer in the Chief Mechanical Engineer's Office, was appointed Inspecting Engineer (Mechanical) two years later and was promoted to Assistant Chief Mechanical Engineer in 1974. The following year Mr McGregor was appointed Deputy Chief Mechanical Engineer.

Mr McGregor entered management in 1978 when he was appointed Assistant General Manager in charge of engineering and development. He will retain these responsibilities as Deputy General Manager.

* * *

Two Bangladesh railway officials, and a Government representative, visited Westrail in February as part of a four-month educational tour of Australia's rail system to study modern railways under working conditions. The tour was arranged under the auspices of the Australian Development Assistance Bureau of the Department of Foreign Affairs.

The team's major interest was the financial aspect of railway operation and they were interested to gauge the success of Management Services Bureau's project evaluations — in particular those covering the upgrading of the standard-gauge line between Kwinana and Koolyanobbing.

Inspection tours were also arranged to Midland Workshops, Forrestfield Marshalling Yards and Kewdale Freight Terminal.

During their visit they studied other facets of Westrail's budgetary techniques and capital evaluation to see what could be adapted to their own conditions. The findings are to be the subject of a report to their Government on return to Bangladesh.

Messrs Khondkar Hossain, Joint Secretary (Railway Finance) Government of Bangladesh, and Taufiqur Rahman and Abdul Ali, financial advisers — Bangladesh Railways, discuss development plans with Westrail's Assistant Chief Traffic Manager (Works and Research), Don Warden.

A modified dogspike shim won $250 from Westrail's Suggestion Board for Per Way Inspector, George Sidelnik. A cheque was presented by the Commissioner of Railways, Mr W. I. McCullough, at an informal function.

The Commissioner congratulated Mr Sidelnik on his achievement and said that the Board had been greatly impressed with the improved fastening of dogspikes resulting from the use of his invention.

"Civil Branch engineers have confirmed that the shims will increase the life of sleepers; it is difficult to assess the full effect at the present time," he added, "but the gain to Westrail will be considerable."

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RAIL FREIGHT.
ENERGY SAVING AND
EFFICIENT.

ROA 1

A $70 million brewery — the most advanced of its size and type in the world — has been completed at Canning Vale, 16 km south-east of Perth. In full production, Swan Brewery Co. Ltd's new facility will have a capacity of 2.5 million hectolitres.

Swan announced its intention to replace the existing Swan and Emu Breweries in October, 1975, following studies which showed that a major rebuild was necessary to achieve productivity levels comparable with those of modern breweries overseas.

A 61-hectare site was acquired at Canning Vale in January 1976 and site construction started the following month. The peak on-site work force topped 600, while thousands were employed in off-site manufacture and fabrication.

Westrail has been closely associated with the brewery since the early planning stages to ensure that a suitable transport link was maintained after the major part of handling was transferred from Kewdale to Canning Vale.

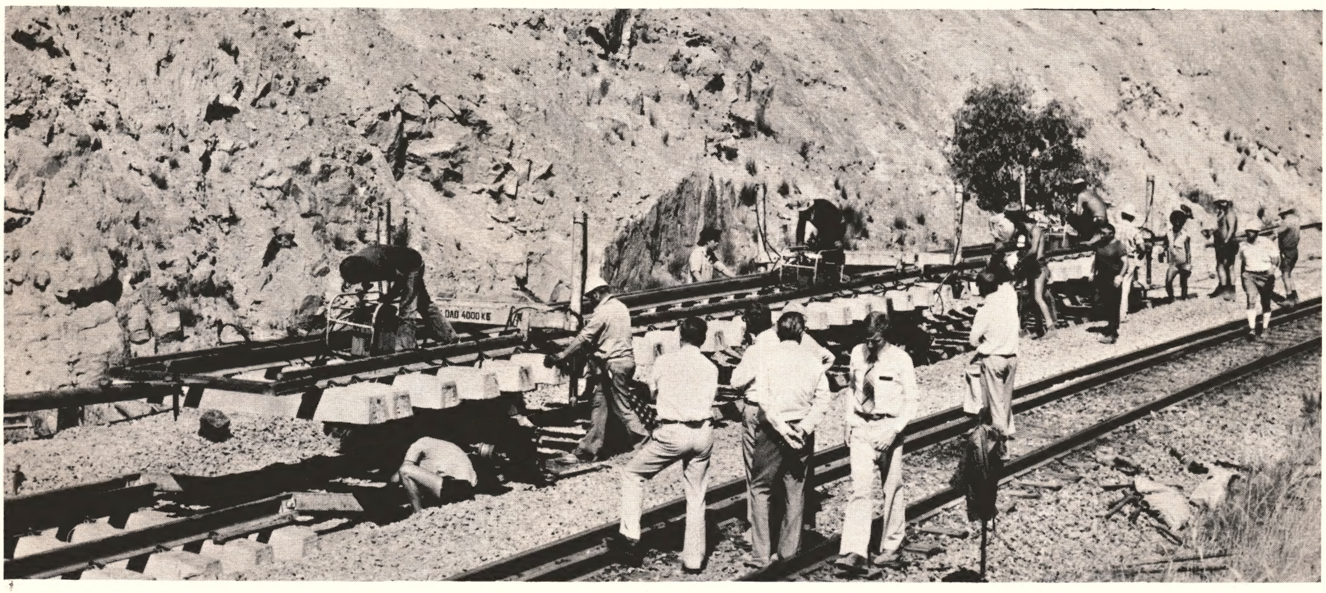
Loading beer at Canning Vale

A 1.5 km dual-gauge rail siding was built from the brewery to the main Forrestfield/Kwinana line which runs dual-gauge between the Canning Vale industrial estate and Kenwick Junction.

One standard-gauge and one narrow-gauge train operate Monday through Friday with wagon-load consignments from the new brewery to Forrestfield Marshalling Yard, where they are sorted for despatch.

The average weekly rail haulage of beer products is 800 tonnes during winter and 1,000 tonnes in summer, with a peak of 1,800 tonnes over the Christmas period.

"Less than car load" consignments are still handled through Kewdale Freight Terminal and are sent direct from Canning Vale to Kewdale in special rail vans.



Nineteen dual-gauge panels, comprising concrete sleepers and 60 kg/m rail, were laid recently by Westrail, using new SRS Swedish lifting gear, on 400-metre curves in the Avon Valley. They were placed over one kilometre on the section between the Moondyne and Jumperkine rail loops.

Fifteen of the panels were 67 metres long, weighing 39 tonnes each, and four were 33 metres long and 19.5 tonnes each.

It is the first time that concrete sleepers have been used by the Western Australian Government rail system and, as far as can be ascertained, the first time on the world scene that dual-gauge concrete sleepers have been laid.

* * *

The 60 kg/m rail will also make the 500 km standard-gauge section between Kwinana and Koolyanobbing the heaviest-duty government railway in Australia, and work on the five-year upgrading programme has started.

Commissioner of Railways, Mr W. I. McCullough, said that some $76 million was to be spent on this project, which involves the laying of 60 kg/m continuously-welded rail on concrete sleepers.

"A supply of sleepers has already been manufactured and stockpiled at the Meckering factory and shipments of rail have reached WA, enabling tracklaying to start late April," he commented.

Sophisticated tracklaying equipment used for the first time in Western Australia would replace sleepers and rails in one operation.

The initial project funds were raised recently by Westrail's first-ever public cash loan of $13 million. "Despite the changing financial market conditions evident at the time, the result of the initial issue augurs well for Westrail's future borrowing programme," Mr McCullough added.

The fourth and final earthworks contract for the Tarcoola-Alice Springs rail link has been awarded by Australian National Railways to the Adelaide-based contractor, MacMahon Construction Pty Ltd.

The $9¼ million contract includes three million cu.m. of earthworks, and construction of 17 minor bridges and culverts for a 220 km section of the new line between Baystone Bore and the final approach to Alice Springs.

ANR general manager, Mr Vern Dyason, said MacMahon Construction had also carried out the project's third earthworks contract and were finishing this section some six months ahead of schedule. Earthworks for the $145 million line are now 600 km north of Tarcoola while tracklaying has been completed for 460 km.

The fourth earthworks stage is scheduled for completion by July 1980; and the first trains are expected to run through to Alice Springs in November 1980, some 12 months ahead of schedule. Construction of the two biggest bridges on the new line across the Finke and Hugh Rivers was now nearing completion by John Holland Constructions Pty Ltd.

* * *

The Perth suburban rail service will be augmented by the first of ten new railcars in about 18 months time. Tenders for building five power cars and five trailers to augment the present fleet will close on June 14.

The railcars, designed to seat 72 passengers, include air cooling of both the passengers' section and the driver's compartment.

Introduction of the new railcars is part of a multi-million dollar programme to upgrade suburban passenger services and facilities on both the Armadale and Midland lines. This will include the building of a major bus/rail interchange at Kelmscott.

* * *

The Australind (Perth-Bunbury) passenger train coaches are being overhauled and refurbished at an estimated cost of $311,000. Completion is expected over the next two years.

The work involves repainting, recarpeting, reupholstering and redecorating of the coaches, in addition to normal attention to their bogies and running gear.

The Minister for Transport, Mr Cyril Rushton, has pointed out that the Australind is an extremely popular train service. "Patronage has been rising steadily since 1974, when 56,097 people travelled on the train. Last year, there were more than 75,000 passengers, and this year's total will approach 78,000.

"The continuing population growth in the Bunbury Region and South West generally and along the line must lead to even higher patronage in the years ahead."

* * *

Sunshine Express, journal of the Queensland Division, Australian Railway Historical Society, in its March issue, commented on road/rail controversies in the light of fuel consumption, maintenance costs and passenger safety, and on comparative narrow-gauge performances as a reflection of alignment, grading and overall standards.

There are reports on the Fuji Express (the third in a series on rail journeys in Japan), on a fairground railway at Caloundra, and an early Queensland diesel contract cancelled in 1952; and a long extract from a report by the Commissioner for Railways on proposals for the Caboolture-Woodford line in December 1900. The covers carry seven photographs.

The editor is Ian Pringle, 71 Eleanor St., Camp Hill, 4152.

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For the **Emerald (Q) Centenary,** *Sunshine Express* also announces a "Steam Extravaganza". Hauled by BB18¼ 1079, a special will leave Rockhampton at 3.35 am on Saturday, 26 May; sleeping berths can be booked for the Friday night. The Governor and other dignatories will be picked up en route and the train will reach Emerald at 11.00 for the festivities.

There will be a steam shuttle service to the Show Grounds, and a Sunday morning trip to Anabie, 43 km west, before returning to the coast, mostly in daylight.

Some members are remaining in Rockhampton on the Monday, and travelling by steam to Yaamba (38 km north) and back on a share-the-cost basis.

The booking officer for the tour is Mr Ian Harper, 4/23 Denham St., Clayfield, 4011. All bookings must be made in advance.

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Electric traction centenary. One hundred years ago, in Berlin, Werner von Siemens demonstrated the use of electricity to drive trains. The most important advance in electric traction technology in this century — 25kV single-phase supply at industrial frequency — wa made possible by improved rectifiers just as the diesel reached maturity.

Since then, the advent of power semiconductors has given the electric locomotive important advantages over its younger rival in terms of low maintenance and better use of available adhesion.

Few have done more to advance electric traction through three exciting decades than Fernand Nouvion, now retired from SNCF but still travelling the world to give help and advice.

In "Electric Traction enters its Second Century", in the April issue of *Railway Gazette International,* Nouvion discusses higher catenary voltages, the contributions of electronics, the exploitation of adhesion, three-phase motors, and even "more intelligent locomotives.

"Overall," he concludes, "the future for electric traction is bright, not just because of the oil problem but in terms of the generous scope for further technical advance. This not only gives electric traction an increasing advantage over the diesel; it also enhances the position of rail relative to other modes."

* * *

IVA 79, Hamburg, June 8 - July 1, will show the products of 28 countries; and what is claimed to be the largest display of rail vehicles ever assembled will occupy 1,800 m of track.

Railway Gazette International reports that, according to the organisers, some 20,000 delegates are expected to attend the forty congresses arranged to coincide with "the biggest and most comprehensive exhibition the transport world has ever seen."

Five of the congresses involve railways, and a conference for engineers in developing countries will be held on 15 June, an explicit theme of IVA being the strengthening of the ties between Europe and the third world.

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The demand for Western Australian 150th Anniversary T-shirts will no doubt increase with the publication of this issue of *Network* — see our front cover. The T-shirts are available from Excitement Enterprises, P.O. Box 2871, Sydney, in a range of sizes and colours.

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